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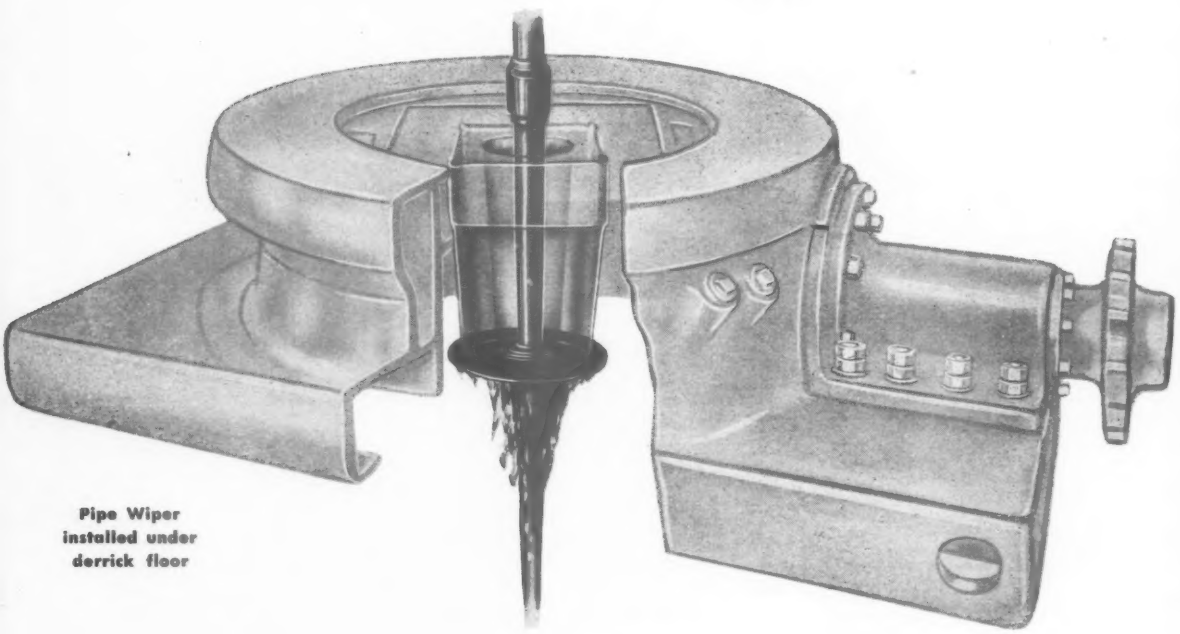

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Trends

Crude-Oil Production By States — Page 88

THE clearest analysis yet issued by a responsible official on the postwar outlook for petroleum industry facilities built specifically for emergency service came last week from Bradley Dewey, rubber director. One of the most pertinent basic conclusions drawn from the postwar discussion is that the synthetic-rubber industry will be compelled to compete on peacetime-economic terms with natural rubber. Dewey advances the possibility that plants might be maintained as standby units, either to function as a governor on the price of natural rubber or as a primary source in event similar conditions, which accounted for the program, should recur.

THE cost of manufacturing butadiene from petroleum hydrocarbons, dependent as Dewey points out on the value of butylenes, will be in the neighborhood of 7 cents per pound, before depreciation. Some authorities, he says, anticipate that butadiene can be made for as low as 6 cents. The cases he mentions are all dependent on postwar refinery values of approximately 5 cents a gallon for motor fuel. Any substantial rise in the value of gasoline would tend to increase the cost of butadiene manufactured from petroleum hydrocarbons because the necessary butylenes would be more valuable if converted into motor fuel. Out-of-pocket costs for manufacture of buna-S rubber at some of the more efficient plants have been less than 14 cents per pound which compares favorably with the New York f.o.b. price of 25 cents for natural rubber before imports were interrupted by the Pacific war. The chief unknown factor in the postwar outlook for the synthetic-rubber industry thus becomes an appropriate rate of depreciation.

DEWEY shows, however, that a substantial volume of synthetic rubber had captured a competitive position because of its superior characteristics in certain services before the war. He anticipates that a much larger volume will find outlets in postwar commerce, irrespective of cost considerations and availability of imports. He refers to the competition for natural supplies certain to result from the industrial renaissance in China, India, many parts of Africa and in Soviet Russia. It is conceivable, in light of Dewey's discussion, that natural-rubber prices will be somewhat higher after the war than in 1940 and 1941, meaning that additional margins for operation would be available.

CRUDE-OIL STOCKS 241,165,000 bbl. as of Dec. 4—up 1,404,000 bbl. One year ago 232,982,000 bbl.

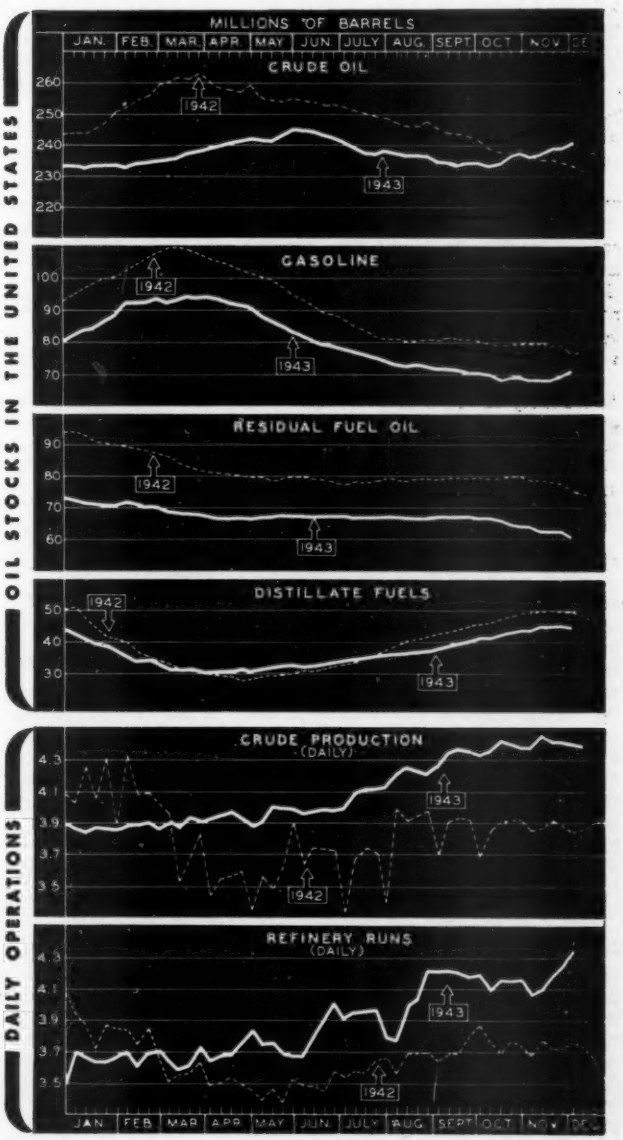
GASOLINE STOCKS 71,040,000 bbl. as of Dec. 4—up 1,060,000 bbl. One year ago 71,872,000 bbl.

RESIDUAL FUEL-OIL STOCKS 61,603,000 bbl. as of Dec. 4—down 540,000. One year ago 75,980,000.

GAS OIL AND DISTILLATE 45,357,000 as of Dec. 4—down 830,000 bbl. One year ago 49,273,000.

CRUDE-OIL PRODUCTION 4,371,870 bbl. daily average—down 23,385 bbl. One year ago 3,857,820.

REFINERY RUNS 4,331,00 bbl. daily week ended Dec. 4—up 70,000 bbl. One year ago 3,744,000.



PIWC Calls for Explanation on Government's Foreign Oil Policy

by Henry D. Ralph

WASHINGTON, D. C.—A crisis in the development of the Government's foreign oil policy was reached last week when the Petroleum Industry War Council demanded a showdown of Harold L. Ickes, Secretary of the Interior and Petroleum Administrator for War.

The council accused Ickes of attempting to put the Government into the oil business, demanded that he lay his cards on the table, and moved toward insistance that the administration adopt a foreign oil policy based on private enterprise and capital backed up by affirmative government diplomatic support.

The discussion, which occupied most of the council's 2-day session, centered on two documents: (1) Ickes' article on foreign oil in the January issue of the American Magazine, and (2) a report proposing a foreign oil policy for the United States prepared by the Foreign Operations Committee of PAW.

Ickes' magazine article suggests the desirability of the federal Government going into the foreign oil business itself through the instrument of the Petroleum Reserves Corp. The FOC unequivocally advocates private enterprise.

Council members interrogated Ickes at length on his magazine article, quoting passages and demanding to know if they represented the administration's settled policy and asking explanations for ambiguous language. Ickes countered by insisting that the administration has not determined its foreign policy yet and will not until the President returns from abroad. He declared that his magazine article simply threw out a few suggestions for discussion, and he attempted to explain away certain alarming passages by insisting that his critics were interpreting them too broadly and were reading into them more than he meant to convey.

Resolutions opposing government oil operations and declaring for fostering of private enterprise were proposed but action was postponed until the January meeting of the council. Instead, the council created a special committee of nine members, all representing companies with no foreign interests, to study the report of the Foreign Operations Committee and report back at the January meeting.

Most of the discussion at the 2-day meeting of the PIWC last week centered on Administrator Ickes' article on foreign oil in the current issue of a national magazine, and a report proposing a foreign oil policy for the United States prepared by the Foreign Operations Committee, PAW. The article suggested the desirability of the Government going into the foreign oil business, a policy strenuously opposed by the council, whose members demanded to know if Ickes' remarks represented the administration's settled policy.

The Foreign Operations Committee itself was roundly criticized by some council members because of the powers delegated to it by PAW and because it is set up outside PIWC as a separate agency with equal or even greater authority. As a compromise, Ickes proposed to appoint Orville Hardin of Standard Oil Co. (N.J.), chairman of FOC, to membership on PIWC. This would give FOC the appearance of being a committee of PIWC.

FOC Report Withheld

The council repeatedly requested Ickes to make public the FOC report on foreign oil policy but he refused to do so. Since the report contains nothing of a military nature, the only reason for this refusal which occurred to observers was that Ickes does not approve of the philosophy of private enterprise which it espouses. However, many council members, in addition to those on the special committee, obtained copies of this report and it is the subject of much discussion in oil circles.

The special committee to study the FOC report is composed of: A. C. Mattei, Honolulu Oil Corp., chairman; W. G. Skelly, Skelly Oil Co.; Charles F. Roeser, Roeser & Pendleton, Inc.; George A. Hill, Jr., Houston Oil Co. of Texas; A. Jacobsen, Amerada Petroleum Corp.: W. H. Ferguson, Continental Oil Co.; Walter S. Hallanan, Plymouth Oil Co.; Ralph T. Zook, Independent Petroleum Association of America; and John M. Lovejoy, Seaboard Oil Co. of Delaware.

Members of the FOC who prepared the report are connected with companies having foreign oil interests. The report was drafted because of the belief of these men, based on their own long experience in foreign oil developments, that oil is destined to play a profoundly important role in postwar reconstruction, and that world-wide oil development by U.S. nationals will not only add to the security of this country but foster the social and economic advancement of all people. The report appears not to have been requested by Ickes but to have been offered as a suggested program of principles and policies designed to advance the interests of the United States, to aid in the constructive development of the oil resources of foreign countries by American nationals, and to release the creative potentialities inherent in petroleum that the world will so sorely need with the coming of peace.

The factors that create an international oil problem are listed by FOC as being highly specialized problems calling for foresight, experience, skill, and statesmanship in their solution. Oil is a unique commodity, it is explained, holding universal interest because it is essential to all industrial activity; the known oil resources of the world are limited and concentrated; oil exploration and discovery present extraordinary difficulties, requiring rare and specialized abilities; and oil is charged with a high economic potential.

Oil development can best be handled by private enterprise, the report declares, because private operations reduce the political dangers inherent in the international field; private enterprise is the best source of venture capital required for the undertaking; private enterprise can best supply and develop the requisite managerial and engineering techniques; and oil operations involve exploration, production, transportation, refining and distribution, so that governments entering the oil business in one area will soon find them-

selves extended, directly and indirectly, into international complications transcending the original locus.

The concern of the United States with world affairs is inescapable, and oil developments abroad are of critical importance in the foreign policy of this Government, FOC declares, pointing out that smoothing the necessary expansion of the world's oil industry will promote world peace and economic stability.

Since the economy of the United States probably faces partial dependence upon foreign oil resources, the report declares that the national security of this country is dependent upon adequate world-oil developments and the security of our military power is enhanced by having adequate and strategically located sources of oil supplies throughout the world in the hands of American nationals.

The United States can benefit all peoples by encouraging the energy of private enterprise in world-oil developments, thereby going beyond the obvious necessity of protecting its own interests by accelerating world reconstruction and raising the living standards of all countries, it is declared. This is based on the statement that the proficiency of the petroleum industry of the United States is an invaluable agent for promoting postwar reconstruction and industrial advancement throughout the world, in that the skill of its nationals in oil developments is an asset of inestimable value which may be galvanized into a powerful force for world reconstruction if implemented by a national policy designed to this end.

In outlining a constructive approach to such a policy, FOC declared that the international oil problem is of such major dimensions that the government of the United States should not only take action with respect to promoting the interests of its own nationals, but should also assume leadership in assuring the collaboration of other nations and the coordination of oil policies among nations.

Operating Principles Proposed

Efficient and orderly development of the world's oil resources, said FOC, should be based on these principles: application of advanced engineering practices, including the concept of optimum rate of production; development of surplus producing capacity available for emergencies; balancing capacity with needs for oil; a clear definition of the respective roles of private enterprise and governments, including dependability of contracts, noninterference with operating procedures once proper rules are set, and equal opportunity among competitors; respect of contracts and machinery for prompt and equitable solution of disputes.

The national oil policy of the United States should aim at securing for American nationals access to the world's oil resources on equal terms with the nationals of all other countries, says the report. It opposes state monopolies and discrimination between nationals of different countries; opposes duties and taxes tending to reduce consumption; advocates taxes and royalties designed to preserve incentives adequate to attract capital and insure continuity of expansion; recognizes that U.S. companies must conform to the laws and customs of the countries in which they operate but asked for U.S. laws permitting American interests to compete abroad on an equal basis with foreign companies; and insists that this government must undertake to see that acquired rights are respected.

Oil in the hands of nationals of the United States is equally available for national security with oil owned or financially shared in by the government of the United States, it is pointed out, and likewise refineries constructed by private initiative for commercial purposes are available during war for the needs of our country.

The FOC declares that the Government should encourage private American enterprise to engage in the development of oil resources abroad, citing these arguments: private American enterprise has already demonstrated its ability in international oil developments; developed foreign sources needed for national security can be obtained only when coupled with commercial distributing facilities; many countries prohibit operations by an agency of a foreign government; government participation in the oil business will discourage private enterprise and increase political complications; Government can assist most by maintaining a foreign oil policy designed to reduce the political risks inherent in foreign oil operations. The committee also recommends that oil storage and other facilities developed abroad for war use be disposed of to private enterprise after the war.

A. C. Mattei, president of Honolulu Oil Corp., who was appointed chairman of the PIWC committee of nine to report in January on foreign-oil policies

Coordination of the policy of the United States with the policies of other nations is advocated to reduce international friction and the growth of dangerous rivalries, and it is declared that this can best be achieved by open discussion and voluntary agreements between governments, possibly by the establishment of special machinery for this purpose.

Prompt Action Urged

A postwar-oil policy cannot wait until the end of the war, FOC points out, because the Government must take immediate steps to obtain more oil for the war, and the two problems are interrelated. Steps taken in the solving of problems of present urgency may set the pattern for the continuing oil policy of this country, and measures initiated under the stress of war conditions and during the period immediately following the end of hostilities should be consistent with the longer-run interests of this country. Time will be required to establish international consultation and coordination, and in the meantime the Government will have to act on oil matters and make decisions of grave importance.

FOC points out that while military needs for foreign oil supplies and probable future partial dependence on imports are increasing, there is an accelerating growth of restrictive measures narrowing the opportunities for the development of the world's oil resources, and the committee argues that therefore a foreign-oil policy must be established at once if the interests of the United States are not to be sacrificed. Action is needed, FOC says, to enlarge the reserves under the stewardship of nationals of the United States and to encourage the retention of existing contracts, and nationals of the United States should not be in a position of inferiority in acquiring and developing petroleum reserves within the territories or spheres of influence of other nations.

Of the three possible methods of developing the oil resources of the world—government operations, private enterprise, and mixed operations—private enterprise is the surest and soundest choice, says FOC, declaring that private enterprise has developed the requisite managerial skill and operating knowledge and is already well established; private enterprise can operate in foreign countries with fewer political complications than can an alien government; opera-

tions of United States oil companies are already nearly world-wide in scope. The greatest immediate need on the part of private enterprise is declared to be the assurance of our Government that it will seek to reduce the risks involved in the use of private capital abroad, and that it will take no steps to discourage the efforts of the nationals of the United States to maintain an effective and serviceable oil industry in foreign countries.

Five Essentials Advanced

Five "bare essentials" of an immediate foreign-oil policy are suggested by FOC:

1. The American oil industry should be encouraged to expand its plans for developing the world's oil resources. This requires assurance that United States nationals will receive government cooperation in securing equal opportunity with nationals of other countries and that the Government itself will not enter into competition with its own nationals.

2. Existing handicaps to oil operations of our nationals abroad should be examined in the light of their incidence on our national welfare, and efforts should be made to remove such handicaps as originate in the laws and practices of the United States. American nationals operating abroad should be able to comply with the laws and customs of foreign countries without incurring the risk of violating American laws.

3. The diplomatic support accorded to our nationals by the Government of the United States should be as effective as that accorded to nationals of other countries by their respective governments.

4. The ultimate disposition of oil facilities and supplies developed or paid for abroad by the U. S. Government in the course of the war should be so designed as to promote the interests of our nationals in the postwar world.

5. Our foreign oil policy should also include appropriate measures for the return after hostilities of American owned properties, rights and interests in Axis held territory; adequate compensation for assets destroyed or damaged; and assurance of early commercial operation of returned properties.

The FOC also declared that the American petroleum industry should be permitted more fully into the policy councils of the Government, and its ideas and experience should be used in a consultative capacity in all policies and measures affecting the future status of foreign-oil operations. FOC suggested that the Government appoint a committee from the United States oil industry to maintain a continuing consultative connection with agencies of the Government having to do with foreign-oil policies. It also suggested that the United States and British governments take the lead in cooperating in the adoption of coordinated foreign-oil policies consistent with the policies outlined for this country. As a possible model for postwar international cooperation in foreign-oil developments, FOC suggested a compact among governments similar to the interstate oil compact of 1935 in this country.

Disney Bill Passes House, Provides 35-Cent Advance

WASHINGTON, D. C.—A bill to require the Office of Price Administration to raise the price ceilings on crude petroleum to not less than 80 per cent of parity with the index of all wholesale prices was passed by the House Monday by a standing vote of 171 to 92.

The bill now goes to the Senate where no action is expected prior to the Christmas recess.

Action came after an all-day debate on H.R. 2887, introduced June 7 by Rep. Wesley Disney of Oklahoma, but before passage the bill was so amended that only three lines of the original language remained. Supporters of the bill professed to be satisfied with the new language and estimated that it would require an increase in crude prices of approximately 35 cents per barrel or possibly somewhat more.

As passed the bill simply requires that in fixing prices for crude petroleum and products under the 1942 price control act consideration shall be given to the necessity for exploring for crude petroleum and the maintenance of a competitive position in the petroleum industry and the petroleum price index shall not be less than 80 per cent of parity nor higher than parity with the index of all commodity prices. Supporters of this language declared this would provide a leeway of an average of between 35 and 74 cents above present prices.

Five-Hour Discussion

The bill was called up by Disney on motion to discharge banking and currency committee from its further consideration, and after brief debate motion was adopted by roll-call vote of 247 to 71. By unanimous consent debate on the bill was limited to 3 hours, but discussion of amendments took another 2 hours.

On motion of Rep. Edward H. Rees of Kansas, the House approved by 72 to 49 amendment to strike out language which would have transferred to PAW all authority over petroleum prices. Disney approved this on the ground that breaking up of OPA might invite a veto.

Disney offered an amendment to require immediate increase of 35 cents in crude prices with permissive rise to parity in the wholesale index, and commensurate increases in products prices, which was adopted 105 to 34, after the House had voted down a substitute by George J. Bates of Massachusetts to limit the increase to a flat 35 cents.

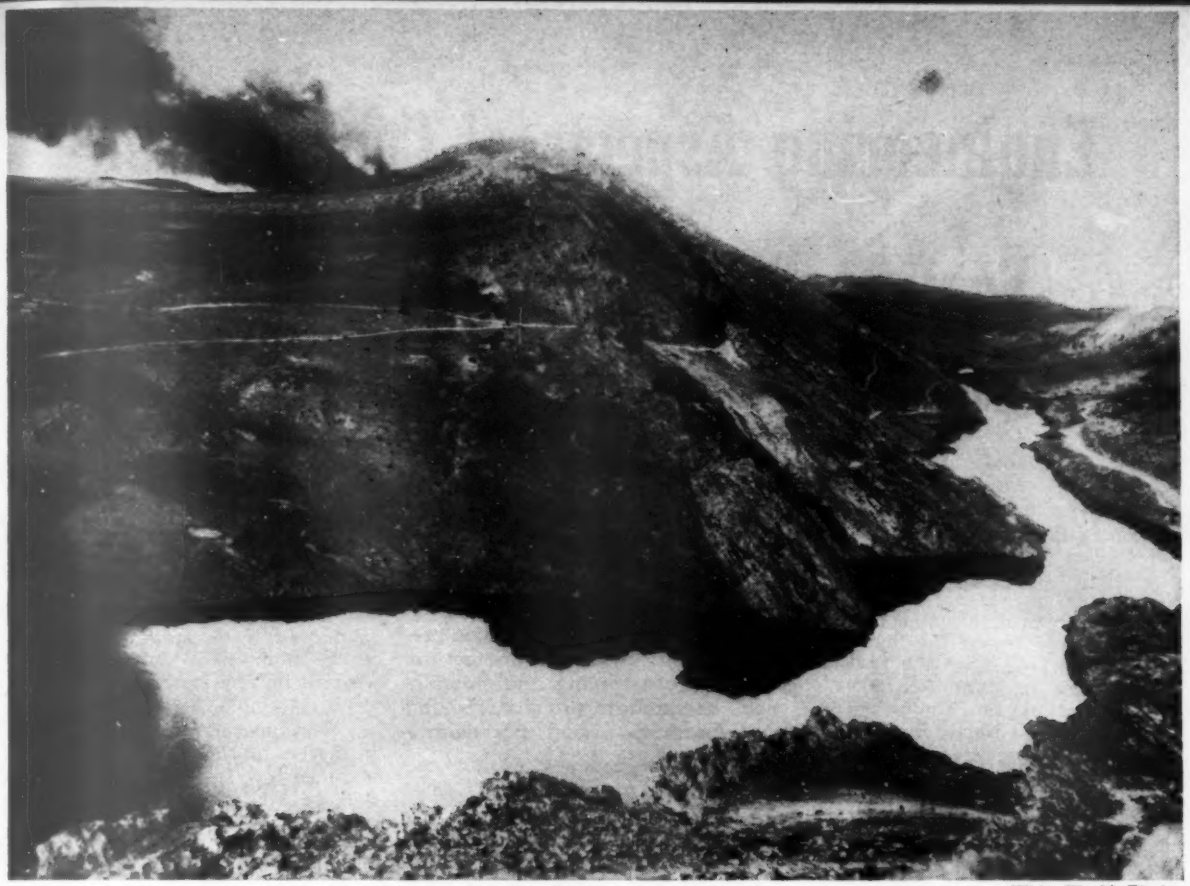
However, Walter C. Ploeser of Missouri offered a substitute eliminating reference to specific prices and requiring the oil index to be between 80 and 100 per cent of parity. He argued that this would be more in keeping with the policy of Congress in laying down legislative rules for administrative agencies, would provide more administrative flexibility, and would not be so objectionable to the executive as a specific legislative price. Over the opposition of Disney and other supporters of the bill this was adopted 93 to 64.

Committee Procedure Defended

Wright Patman of Texas, who was chairman of a small-business committee which recommended a 35-cent price increase, said he still favored the increase but opposed the Disney bill on the ground that regular committee procedure should be followed.

Disney carried most of the argument for the bill, summarizing the case for an increase as presented to and recommended by several other committees of Congress, speaking largely from a series of PAW charts which were part of a recent report of the PIWC production committee.

Contrary to some expectations, no attempt was made to load the bill with amendments increasing the price of other commodities. One amendment was offered to give the Solid Fuels Administration for War authority over prices of any mineral which through hydrogenation could produce oil, but the speaker ruled this was not germaine. A motion by Bates to recommit the bill for further study by the banking and currency committee was lost by a roll-call vote of 128 to 206, and immediately after that the bill was passed.



Wide World Photo.

A flowing well 5 miles north of Kirkuk in Iraq where troops of that country's army were reported to have assumed control last week. Iraq is an important source of supply for Allied fleet operations in the Mediterranean

THIS WEEK

PRICES—Disney bill passed by House, calling for price ceiling pegged to 80 per cent of parity. . . . Administration left in hands of OPA. . . . Administration leaders in Senate expected to use delaying tactics. . . . Possibility remains of compromise offer from Office of Economic Stabilization, Office of War Mobilization, and Office of Price Administration. . . . Future outlook depends much on strength of oil delegation in Senate. . . . ¶House legislation provides for commensurate upward adjustment of product prices in balance with crude-oil quotations. . . .

TRANSPORTATION—ODT authorizes transfer of undisclosed number of tank cars for hauling petroleum and products from interior and Gulf Coast centers to California. . . . ¶Laying of 20-in. pipe to East Coast completed last week. . . . Product movement to be started in short time. . . . ¶WEP movement of crude oil from Longview, Tex., sustained near 24-in. line capacity. . . . ¶Importance of tankers confirmed by Administrator Ickes' statement that imports may rise to prewar levels, early next year. . . .

FOREIGN—PIWC forcing showdown on policies and activities of Petroleum Reserve Corp. . . . Committee of nine appointed to probe deeper into foreign-oil program, report back at January meeting. . . . ¶Foreign Operations Committee recommends international compact agreement, patterned after Interstate Oil Compact Commission. . . . ¶Schedule calls for substantial increase in Colombian exploratory drilling next year. . . .

PRODUCTION—Subcommittee finds District 3 could increase output about 140,000 bbl. daily, without waste. . . . All states in district, except Texas, exceeding maximum-efficient rate, committee finds. . . . ¶Conservative withdrawals in Kansas proving to be sound practice, with passage of time. . . . ¶Current rate of crude withdrawals of nearly 4,400,000 bbl. daily place critical test on producing ability of entire nation. . . .

REFINING—Formal protest against Defense Supplies Corp., reimbursement offer to District 2 refiners filed by PIWC. . . . Provision barring plants in excess-profits bracket branded "discriminatory" and "ineffective in meeting an emergency situation." . . . ¶Refiners discuss renegotiation at Chicago with Navy Price Adjustment Board. . . ¶Plant contracts increased by Defense Plant Corp., with Crown Central Petroleum Corp., and Mohawk Petroleum Corp., aggregating $3,100,000. . . . ¶Continuing expansion indicates 100-octane program not yet static. . . .

Engineering Aspects of Conservation Feature Oil-Compact Discussions

by H. Stanley Norman

WICHITA, Kans.—Engineering aspects of conservation held the spotlight at the winter quarterly meeting of the Interstate Oil Compact Commission here last week.

A detailed report on results on dual completions in Arkansas and a general summary of multizone operations in Texas were among the highlights of reports arranged by the research and coordinating committee.

V. E. Cottingham, Midland, Tex., chairman of the North Basin Pools Engineering Committee, and W. H. Rouzer, Jr., Wichita Falls, Tex., engineer for the K.M.A. Pressure Maintenance Association, presented reports on results of voluntary and cooperative conservation work in those two areas.

Evidence that the commission fully endorsed the effort to deal with more specific phases of conservation was given by unanimous approval of a recommendation by J. C. Hunter, vice chairman, that discussions of that general type be continued before the regular meetings of the compact.

P. J. Hoffmaster, supervisor of wells, Michigan Conservation Commission, and representative of that state on the commission, proposed that the research committee expand its study of natural gas to include more specific data on the volume wasted and what could be done to eliminate or reduce this violation of conservation theory.

Water-Flood Report Praised

By resolution, the commission commended the Bureau of Mines for its report on water-flooding operations in Oklahoma. The commission also placed its support behind the Bureau of Mines in preparing similar water-flood reports on Kansas and Illinois. Hunter questioned the completeness of the Oklahoma report because it failed to include the cost factor. Ludwig Schmidt, senior petroleum engineer at the Bureau of Mines station, Bartlesville, Okla., explained that most of the cost data reflected prices of used equipment and that because current conditions are so dissimilar to those prevailing during the installation of Oklahoma floods that it was considered prudent to eliminate this factor. Hunter pointed out that

The report by the Arkansas Oil and Gas Commission on dual completions in that state appears on pages 34 and 35. Interest is high in multizone completions, the results attained, consumption of critical products and the engineering technique involved. Differences of opinion prevail among engineers on the desirability of adopting dual completions as standard practice, making the Arkansas report particularly timely.

it is practically impossible to analyze success of individual floods without inclusion of cost.

Gov. Andrew F. Schoeppel of Kansas was reelected chairman of the compact and Hunter was renamed first vice chairman. S. F. Peterson, representing Illinois, was elected second vice chairman, and Charles L. Orr was reelected secretary.

L. B. Taylor, petroleum engineer for the Kansas Corporation Commission, Wichita, was elected chairman of the research and coordinating committee, succeeding Dan O. Howard, Oklahoma Corporation Commission.

An exhaustive survey of the administration of oil and gas conservation laws was the major work of the research and coordinating group during the past 3 months. Brief summaries were presented by the various representatives. Joseph L. McHugh, director of the Louisiana Conservation Division, invited special attention to the law in his state, advancing it as one of the most inclusive acts yet adopted by any state.

The invitation of McHugh to hold the next quarterly meeting, probably in March, at New Orleans, La., was accepted by the commission. Date will be set by the executive committee.

Dan O. Howard, 1943 chairman of research and coordinating committee, and L. B. Taylor, newly elected chairman of the committee

Scope of Operations

The North Basin Pools Engineering Committee, Cottingham reported, compiles all general engineering and statistical data for the fields as a unit. Through these monthly and annual reports, the individual operators may determine relationship of their properties to all other leases in the fields. The more technical engineering projects, he said, are carried on by the individual operator. Such projects as bottom-hole sampling, core analyses, productivity indexes, permeability and saturation tests, and many others, he said, could be carried on under the auspices of committee engineers. Cottingham said that costs of conducting the engineering committee functions had averaged $0.00231 per barrel.

High gas-oil ratios are becoming a more serious problem in the North Basin pools. The committee has started a program of spot checking ratios for the advantage such data will afford in adjusting withdrawals. Cottingham's committee is operative in six oil fields located in five West Texas counties. The fields contained 3,218 producing wells covering an aggregate of around 140,000 proven acres of oil land. He said that the estimated reserves underlying this acreage approximately 1 billion barrels of oil, or about 5 per cent of the nation's total. Fields under the committee's jurisdiction include Seminole, Wasson, Waples-Platter, Ownby, Dean and Slaughter. They are located in Gaines, Yoakum, Cochran, Hockley and Terry counties.

Members of the research and coordinating committee are: Front row, Hiram Dow, Roswell, N. M.; Lloyd L. Jordan, El Dorado, Ark.; Joseph L. McHugh, New Orleans, La.; Jack Baumel, Austin, Tex.; L. B. Taylor, Wichita, Kans. Back row, S. T. Peterson, Springfield, Ill.; P. J. Hoffmaster, Lansing, Mich.; J. B. Wilson, Dan O. Howard, and E. G. Dahlgren, Oklahoma City, Okla.; and F. M. Van Tuyl, Golden, Colo.

Rouzer said that success of the K.M.A. cooperative-reservoir control is proven by current calculations that 20,000,000 bbl. of crude oil have been recovered as a direct result of pressure maintenance. In one area containing 106 wells operated by companies and individuals who are nonparticipants in the cooperative program, Rouzer said, current average production is 6.1 bbl. of oil daily per well and that cumulative recovery has averaged 1,511 bbl. per acre. In a comparative area included in the pressure-maintenance program, 324 wells have recovered 1,752 bbl. per acre and current average 19 bbl. of oil a day per well under proration. He said that the estimated increase of 30 to 40 per cent in ultimate recovery because of the K.M.A. pressure-maintenance project now appears to have been substantially on the conservative side.

Members of the compact executive committee concurred in a statement by Hunter advocating diplomatic protection for United States companies in foreign operations. He expressed alarm over the trend of this Government's foreign-oil policy and over the ability of the United States to develop an adequate long-term supply of petroleum under indicated conditions. He hinted at the desirability of creating an international oil compact commission which would deal with general aspects of supply and conservation along the lines prevailing in the interstate organization.

W.P.R.A. Speaker Questions Oil Shortage

PROPHECIES that petroleum resources of this country will be exhausted soon are not accepted without reservations by Edwin L. Dennis, of Baton Rouge, La., chief combustion engineer for Coppus Engineering Corp., who spoke in Tulsa December 10 before a meeting sponsored by Western Petroleum Refiners Association. Dennis, whose address was devoted primarily to a discussion of the economics of combustion, with particular reference to elimination of refinery waste, paid a tribute to the "epochal achievement" of refiners in meeting the "skyrocketing demands for military gasoline, lubricating oils, and other products of petroleum," but he offered a word of caution concerning predictions that the technical advances made by refiners might be neutralized by depletion of the crude supply.

"Because of the ability of the oil industry to meet the demands for more and more gasoline, rubber, TNT, and other products of petroleum for the war effort," said the speaker, "the statisticians have produced very alarming figures concerning the life expectancy of the industry. We have heard and read that there would be no more oil in a very few years. This life line of the industry has been definitely predicted as running out in 8 years, 10 years and only today we learned from a national news commentator that it would be 20 years. It is not intended to make light of a very serious matter. The figures, of course, were arrived at by dividing the known oil reserves by the present rate of consumption. In this case, however, the dividend and divisor are both variables and therefore the quotient or life expectancy of the industry is certainly an unknown.

"We do know that the producing part of the oil industry is not standing still but is keeping pace with the refiners and as a result more reserves will be discovered, more efficient recovery will be developed and other improvements made that will increase the oil reserves. We also know that even with realization of every dream of peacetime prosperity and air-borne passengers and freight traffic there will be a great decrease in the present demand on continental oil reserves when peace comes and even possibly before peace. As victory approaches, oil supply from sources now out of Allied hands will again become available. Therefore, it can be said that a greatly reduced divisor, or rate of oil consumption from continental supply is in the offing. With this thought of an increasing 'dividend' and reducing 'divisor' who can predict the 'quotient' or ultimate life of the American oil industry?

"We do not believe the industry is approaching the plight of an old man in his dotage. Neither is the industry any longer as a young man in his nonage. It has gone through the adolescence of youth when oil fields were wastefully exploited, refineries were run without thought of conservation of material and without too much thought given to efficiency."

Available Crude-Oil Supply in District 3 Above Production

AVAILABLE daily crude-oil supply that can be produced without waste from the various fields of District 3 of PAW, comprising the states of Arkansas, Louisiana, Mississippi, New Mexico and Texas, is estimated at 2,617,203 bbl., according to a report just compiled by the district's production subcommittee on reserves and development. This capacity is only approximately 140,500 bbl. greater than the current daily average production, which totals 2,476,650 bbl. The district represents upwards of 75 per cent of the proved petroleum reserves of the country.

Estimates of the committee do not take into consideration types of crude necessary for the war effort, nor adequacy of field tankage and pipeline capacities that would necessarily be involved in making the indicated crude available for refinery utilization. Instead they represent average rates or sustainable rates for the 6-month period ending June 30, 1944.

Considering the states individually, only Texas is capable of producing more crude than current production. Production of each of the other three states already is in excess of their respective abilities to produce without waste. Texas, however, has an additional available crude supply above present production of approximately 185,500 bbl. This does not mean that there are not many individual fields in the other states that cannot produce without waste more than their current output.

The latter is indicated by the fact, not shown in the accompanying tabulations but revealed in the detail of the committee report, that there is an additional available daily crude-oil supply of 3,000 bbl. from South Louisiana. This margin, however, is overbalanced by the excess production indicated for North Louisiana fields.

The committee report compares the crude availability with September production and November allowables, showing it to be 219,094 bbl. greater than the former, but 40,253 bbl. less than the latter.

COMPARISON OF CRUDE AVAILABILITY WITH CURRENT PRODUCTION BY STATES

State—	Estimated crude availability (bbl.)	Current daily average production (bbl.)	Availability vs. production (bbl.)
Arkansas	72,020	79,860	—7,840
Louisiana	338,575	354,120	—15,545
Mississippi	36,342	47,220	—10,878
New Mexico	101,884	112,550	—10,666
Texas	2,068,382	1,882,900	+185,482
Total	2,617,203	2,476,650	+140,553

COMMITTEE REPORT ON PRODUCIBILITY

State—District	Bbl. per calendar day—September production	Bbl. per calendar day—November allowable	Dec. 1, '43—Committee determination	Additional availability over Sept. production
Arkansas				
Uncontrolled	20,495	20,495*	19,565	— 930
Controlled	51,318	57,831	52,455	+ 1,137
Total	71,813	78,326	72,020	+ 207
Louisiana				
North Louisiana	68,107	77,787	59,995	— 8,112
South Louisiana	269,126	282,758	278,580	+ 9,454
Total	337,233	360,545	338,575	+ 1,342
Mississippi	48,765	48,765*	36,342	— 12,423
New Mexico				
Northwestern	1,127	1,127*	1,112	— 15
Southeastern	111,366	114,311	100,772	— 10,594
Total	112,493	115,438	101,884	— 10,609
Texas				
District 1	20,202	25,427	22,186	+ 1,984
District 2	117,081	147,080	137,270	+ 20,189
District 3	448,938	511,347	477,621	+ 28,683
District 4	155,830	191,840	176,354	+ 20,524
District 5	27,324	42,945	43,431	+ 16,107
District 6	480,111	494,264	482,861	+ 2,750
District 7-B	25,383	30,766	23,931	— 1,452
District 7-C	18,225	20,697	23,217	+ 4,992
District 8	317,643	362,415	486,491	+168,848
District 9	115,009	134,653	105,020	— 9,989
District 10	102,059	92,948	90,000	— 12,059
Total	1,827,805	2,054,382	2,068,382	+240,577
Grand total District 3	2,398,109	2,657,456	2,617,203	+219,094

*September reported production.

Engineers Plan Further Study of Corrosion

DALLAS, Tex.—A further study of the causes of high-pressure, low-temperature corrosion, correlation of conditions in distillate fields where corrosion may exist, and the possible development of a research investigation into the problem were matters discussed at a meeting at Dallas last week of engineers from companies owning recycling properties.

The committee does not plan a formal questionnaire but each company represented at the meeting, and others interested in the problem, will contribute data on pressure, temperature, water and gas analysis, and other pertinent data on fields producing gas at high pressures. Type of information needed was discussed thoroughly at the Dallas meeting.

E. A. Bacon, Lone Star Gas Co., Dallas, was selected chairman and Walter F. Rogers, Gulf Oil Corp., Houston, and W. E. Winn, Sun Oil Co., Dallas, were appointed members of a committee to correlate the information and to contact scientific and technical organizations for the purpose of developing a research program.

The meeting was called when it became evident that this particular type of corrosion was not occurring in isolated instances but that a number of different fields being recycled were faced with the same serious problem.

Persian Gulf Companies Expanding Refinery Units

NEW YORK.—Bahrein Petroleum Co., Ltd., California Arabian Standard Oil Co. and Anglo-Iranian Oil Co., Ltd., are launched on an extensive refinery construction program in the Persian Gulf area, it was reported here this week in usually well-informed quarters.

California Arabian Standard will build a 50,000-bbl. refinery in Saudi Arabia; Bahrein Petroleum is doubling capacity of its plant on Bahrein Island and Anglo-Iranian is expanding its facilities for manufacture of 100-octane gasoline, according to the reports here.

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BY PATRICK C. BOYLE

the OIL AND GAS JOURNAL

Emergency Points Way

IT becomes increasingly apparent that the emergency has brought changes in the marketing division of the oil industry, many of which should continue in the postwar period.

Operators are in agreement that most of the thousands of bulk and service stations which have been closed over the past year should be dismantled and should not be rebuilt at their present locations or elsewhere. Their operation previous to Pearl Harbor was an unnecessary burden on the entire industry and on consumers of petroleum products.

The war has been termed a "survival of the fittest" period in petroleum marketing, something that has been needed for a long time. Rationing has brought reductions in gallonage and there have been shortages in manpower and materials. The competent as well as the incompetent among the jobbers and dealers, and within the oil-company operations, have suffered. But the net result has been to place petroleum merchandising on a sounder operating basis in many respects.

The sale of most petroleum products—particularly gasoline—starting many years ago was too often motivated by gallonage rather than profits. All the blame did not rest with the marketing departments. Basically the unwanted practices of distribution often came from the tendency to overproduce crude oil with the resulting pressure for more sales to consumers.

From this came hundreds of thousands of bulk and retail units. Competition did not stop with numbers but included the elaborate facilities of the station "palaces" with numerous free services which had no parallel in any other type of merchandising.

As gallonage per unit went down margins for marketing had to go up until the spread in the case of gasoline exceeded the return to the refiner. Price wars in which a few sellers by cutting out some superfeatures were able to undersell the general price levels were the inevitable result.

The public came to believe that it was being overcharged by its regular sources of supply. Actually most of the charge for the unneeded duplication of facilities and these marketing folderols was paid for by the industry itself as reflected in the price for crude oil at the wells and the margins allowed for refining. The oil business does not differ from any other industrial enterprise in which the whole helps pay the costs for the misdirected activities of part.

War developments have clearly revealed the strength and weakness of the industry's distributing methods. Despite reductions in total gasoline gallonage over most of the United States, many jobbers and dealers have been able to increase their own sales and profits. The operators who were accustomed to rely on the financial support of their suppliers are disappearing. As the number of distributing units has decreased there has been less pressure for wider margins from those who are continuing in business.

Because of the manpower shortages station hours have been reduced with accompanying savings in fuel and light costs. There are few complaints from consumers who have found out that the reductions in marketing services to reasonable levels still give them everything they need.

This does not mean that operators, now or later, should give up any of the essential services to motorists and other customers which have been part and parcel of the oil business from its beginnings. The war, however, has shown the way in which extravagance in distribution, amounting to waste, can be dropped for all time.

Dually Completed Arkansas Wells Save Money and Critical Equipment

*by L. L. Jordan and Alec Crowell**

This report on status of dual completions in Arkansas was presented at the winter quarterly meeting of the Interstate Oil Compact Commission in Wichita, Kans., December 10. Current effort of the industry and Government to obtain maximum production with min'mum expenditures of critical metals makes this report on specific results particularly timely.

MORE than $2,250,000 and 6,700 tons of steel are the initial savings effected by the first 37 dually completed oil and gas wells in Arkansas. These dual completions, as of December 1, 1943, account for an average monthly production of 200,000 bbl. of high-gravity crude oil and condensate and 2,100,000,000 cu. ft. of natural gas. The high-gravity production is used as a diluent for waxy East Texas crude, facilitating the movement and greatly increasing the volume that can be transported by pipe line to the eastern seaboard, while the natural gas, after its sulfur and natural-gasoline content are extracted, moves on in its entirety to war industries and military facilities.

Concurrent production from two productive zones through a single well bore has only recently become mechanically acceptable. The Arkansas Oil and Gas Commission had, up until May 27, 1942, looked upon multiple-zone completion of oil and gas wells as too hazardous, conservationwise. Then the commission found that mechanical devices were available which would permit the dual completion and production of wells having more than one commercial pay section without the commingling of fluids or gas.

Upon the issuance of the order permitting dual completions, the commission made the matter elective, but provided that only two formations could be produced simultaneously, one through the tubing and the other through the annular space between the tubing and casing. They also made the completions and recompletions subject to four conditions:

1. That sufficient notice be given the director of production of the commission to enable him to notify all offset operators of a proposed dual completion into one of a multiple or separate zone.

2. That these dual completions be made in such a mechanical manner as to meet with the approval of the director of production and chief engineer of the commission.

3. That no sweet gas be produced from any formation through a dually completed well or any other well for any purpose other than as provided by the conservation law. No sweet gas of any type be permitted to escape to the air.

4. That each well dually completed be regarded as a separate and distinct well; that a permit be secured for the dual completion as though the well were a new well; that the production be taken separately and measured separately; and that all rules, regulations and orders governing individual oil or gas wells shall be strictly adhered to.

*Engineers, Arkansas Oil and Gas Commission.

Cost Comparisons

The commission heard evidence at its hearing on May 27, 1942, to the effect that the average cost of the common deep well in Arkansas, including casing, tubing, christmas tree, etc., is approximately $78,100. It was recorded that a single-zone completion to 8,000 ft. would cost $65,600 and one to 9,000 ft., would cost $76,700. Thus by dual completion, a saving of $64,200 or 45 per cent of the cost of the two wells could be realized.

Further, the commission was advised that the total steel necessary for completion of the deep wells was approximately 200 tons, while for a dual completion, the figure was only 13 tons more.

From the evidence adduced at its hearing, the commission issued the order mentioned, having secured verbal agreement on its contents from the Petroleum Administration for War. Three operators proceeded to recomplete their wells in accordance with the terms of the order, but on June 11, 1942, the commission was advised by PAW that these dual wells were in violation of Conservation Order M-68. Unfortunately, a year's time elapsed before the PAW was convinced of the wisdom of the commission's order. The PAW issued its Supplementary Order 9 to PAO 11 on May 22, 1943, which is applicable to the Dorcheat-Macedonia field. Development has gone forward at a rapid rate since that time, the foregoing having been mentioned only in explanation of the retarded development between May 27, 1942, and May 22, 1943.

Thirty-two of these 37 dual completions are in the Dorcheat-Macedonia field of Columbia County. This field, which is under an extensive development program, has already proven a reserve of 90,000,000 bbl. of oil and distillate and over 400,000,000,000 cu. ft. of natural gas. There are 66 producing well bores in the field, 21 of which are located on 1,160 acres and operate as a unit, while two are on 40-acre units and the remaining 43 are in the center of 80-acre units.

The deeper pool—Smackover limestone—which is found at a depth approximately 8,600 to 8,800 ft., subsea, accounts for two-thirds of the reserves mentioned, while the remainder is credited to the upper productive pools—Cotton Valley sandstone—which is found from 6,500 to 8,200 ft., subsea.

On December 1, 1943, the 66 well bores in the Dorcheat-Macedonia field represented 25 single completions in the Smackover limestone, 9 single completions in Cotton Valley sandstone lenses, 8 dual completions in two Cotton Valley sandstone lenses, and 24 dual completions in the Smackover limestone and Cotton Valley sandstone. Thus, 66 holes drilled in this field and are getting the production from 98 wells.

The upper pools in this field are numerous sandstone lenses (Cotton Valley) with reservoir pressures of from 2,900 to 3,600 lb. per sq. in. Some of the lenses produce water-white condensate of 60°-66° A.P.I. gravity with ratios up to 20,000 cu. ft. to the barrel. Other lenses produce dark 42° A.P.I. gravity oil with ratios as low as 900 cu. ft. to the barrel. The gas, without exception, is free from hydrogen sulfide.

The lower pool (Smackover lime)

has intercommunicating porosity throughout with a maximum interval above water at 122 ft. While the major portion of the reservoir volume contains gas, there is a varying column of oil across the pool. A few wells are now producing from this oil section, but the majority produce a liquid ranging in color from water-white to straw of 60°-66° A.P.I. gravity with ratios up to 20,000 cu. ft. to the barrel. The reservoir pressure is 3,210 lb. per sq. in., the temperature of the zone nearest the packer 220° F., while the gas contains an average of 1,945 grains of hydrogen sulfide per 100 cu. ft.

The general program of well completions in the Dorcheat-Macedonia area has been to drill the entire hole by rotary, cement 100 to 400 ft. of 13⅜-in. surface pipe with 200 to 375 sacks, 2,200 to 4,100 ft. of 9⅝-in. intermediate casing with 1,000 to 1,800 sacks, the oil string of 5½-in. casing through the producing Smackover with 2-in. tubing. Both single and double separation are in use, while the general practice is to use wooden storage tanks.

Packer Trouble Absent

That dual completions have been successful is reflected in a brief resume of operations at a well completed over a year ago and as yet there has been no evidence of packer leaks. This well was drilled to 8,920 ft. and a 5½-in. oil string of 17-lb. casing set at 8,919 ft. and cemented with 1,800 sacks of cement. The plug was drilled out to 8,915 ft., and a Cotton Valley lens was gun-perforated from 7,190 to 7,200 ft. with 80 shots. A Halliburton testing tool was run and a Cotton Valley lens tested. On this initial drill-stem test, with a 16/64-in. top and bottom choke, 33 bbl. of 47° A.P.I. gravity oil and 37,365 cu. ft. of sweet gas were produced.

Following this test the Smackover limestone was gun-perforated from 8,873 to 8,895 ft., with 176 shots. A hook-wall packer, without circulating ports, was run in the hole on 2⅜-in. tubing, the surface joint of the tubing being a slick joint so as to permit raising and lowering through the tubing head and still have the well under control at all times.

The mud in the well bore was displaced with clear water and a pressure of 500 lb. placed on the casing for a short period, thus displacing some of the water with gas. The packer was then lowered in place and set. By the time the operation of bolting down the christmas tree was completed, the Cotton Valley lens was flowing through the casing.

One trip with a swab was necessary to bring in the Smackover lime production through the tubing. On the initial test the Smackover limestone produced 240 bbl. of 64° A.P.I. gravity condensate and 3,100,000 cu. ft. of gas.

Schematic layout of a dually completed well in the Dorcheat-Macedonia fields, Columbia County, Arkansas

Multiple-zone completion of oil and gas wells, based upon the foregoing discussion, sounds as though they were relatively simple. This is not a fact. Of the first 16 attempted dual completions in Arkansas, half were unsuccessful in segregating the production from two zones in the initial effort. However, experience now has made dual completion or dual recompletion of oil and gas wells in Arkansas as routine as any drilling and original completion operation.

Judge Hunter Again Heads Mid-Continent Oil Group

JUDGE J. C. HUNTER, vice president of Grisham-Hunter Corp., Abilene, Tex., was reelected general president of Mid-Continent Oil and Gas Association at the annual meeting of the board of directors held December 13 in Tulsa. A resolution adopted by the board commended Judge Hunter for his work in behalf of the oil industry and pledgd support.

The by-laws of the association were amended to expand the activities of the Louisiana-Arkansas division so as to include oil developments in Mississippi. The name of that division was changed to Louisiana-Arkansas-Mississippi.

Clarel B. Mapes, who has served the association 16 years, was reelected secretary-treasurer. D. W. Harris, vice president of Arkansas Natural Gas Corp., Shreveport, La., was reelected president for Louisiana and Arkansas, and Van S. Welch, of Flynn, Welch & Yates, Inc., Artesia, vice president for New Mexico.

Frank M. Porter, of Fain-Porter Drilling Co., Oklahoma City, Okla., was chosen first vice president, succeeding George C. Gibbons, Dallas, Tex.

S. Maston Nixon, president Southern Minerals Corp., Corpus Christi, Tex., was named vice president for Texas, succeeding George Sawtelle, Kirby Petroleum Co., Houston, Tex.

Edward F. Bullard, vice president of Stanolind Oil & Gas Co. Tulsa, was named vice president for Oklahoma, succeeding Frank O. Prior, president of Stanolind, who refused reelection.

E. B. Shawver, independent operator of Wichita, Kans., was named vice president for Kansas, succeeding Ralph Pryor, of Pryor & Lockhart.

Gulf Pleased With Efficiency Of Women Employes

This is another Journal case-history report on how oil companies are handling the manpower shortage and the necessity of training employes on short notice for replacement of skilled and technically trained men inducted into military service. Drafting of fathers, spreading in many areas, intensifies the manpower shortage in petroleum operations.

PORT ARTHUR, Tex.—Officials of the Gulf Oil Corp.'s refinery here will be happy to reassemble their original organization, when the returning servicemen are discharged. And the women workers who replaced them in numerous jobs, will rejoice at the chance to relax after working at war tasks which had proved more complex and difficult than some of them had anticipated.

Nevertheless, Gulf officials are and always will be grateful for the accomplishments of these women, many of whom tackled jobs despite their lack of experience but with a determination to uphold the home front. While they may not have turned in a polished performance in all cases, they and other employes keep the wheels moving at such speed that all of Gulf's departments have been able to maintain commendable production schedules.

Gulf for many years has used women workers for certain tasks but it was not until the autumn of 1942 that departmental personnel began to assume a more feminine complexion. With new plant facilities coming into production and with a shortage of qualified men in the labor market, Gulf last year began an intensive training program for women to replace men entering the service or transferred to other units.

An outstanding experiment in the employment of women at the Gulf Oil Corp. plant here took place, suitably enough, in the four laboratories operating under the supervision of the chief chemist.

Above: Mrs. R. P. McCoy, Mrs. W. D. Armintor and Doris Smyth in the analytical laboratory, making gas analyses

Left: Mrs. Rose Marie Arthur, standing, and Evelyn Jackson determining the sulfur content of products by the lamp method

In its employment program for women, Gulf sought to select those who were related to present employes of the plant. Preference in all cases was given to wives of Gulf employes who had been called into service.

Second choice was given to wives of men in service regardless of whether their husbands had previously worked for the company.

Another important consideration was that of age. It is the policy to limit employment to women between the ages of 18 and 35. However, it was necessary to make exceptions in certain instances and for certain types of work. In all cases preference was given to the more mature women.

Moreover, the company tried to make a practice of hiring women who had previous work experience and who were accustomed to regular hours and the obligations of a job.

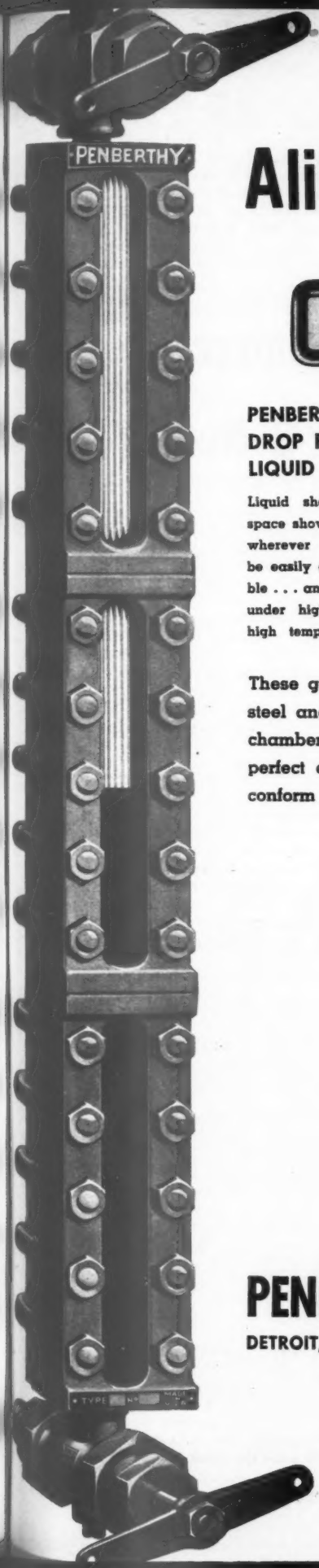
Trainees Selected

In the laboratory a serious effort was made to employ graduate women chemists or women who had finished science courses. It was found difficult to obtain a sufficient number of persons with these qualifications; as a consequence the laboratory women claim experience ranging from teaching school to clerking in stores. One former hospital technician was among those hired and her training has proved of excellent benefit to her work.

Laboratory employment was so organized that a group of 10 women was chosen at the start and given a 2 weeks' training course. This involved an arrangement of lectures supplemented by actual practice in the laboratory. These women were put under the supervision of an expert chemist who had school teaching experience and the ability to impart the knowledge which he possesses. Group meetings were held 2 hours each day and the remaining 6 hours were occupied in active operating procedures with the trainees conducting tests with actual samples and the instructor standing by for suggestions and criticism. A study outline was prepared by the laboratory supervisor using the "A.S.T.M. Standard on Petroleum Products and Lubricants" and covering such topics as gravity, viscosity, flash, the safe handling of inflammable liquids and the like.

At the end of 2 weeks' training the women were absorbed into laboratory staffs and another group of 10 women was employed. After four such units had been added to the organization, additional employes were added singly as needed, without formal training being given and these later neophytes learned by absorption from the more experienced people.

At the outset it was explained to the women that they were taking a



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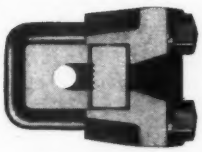

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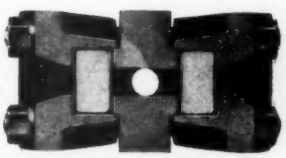

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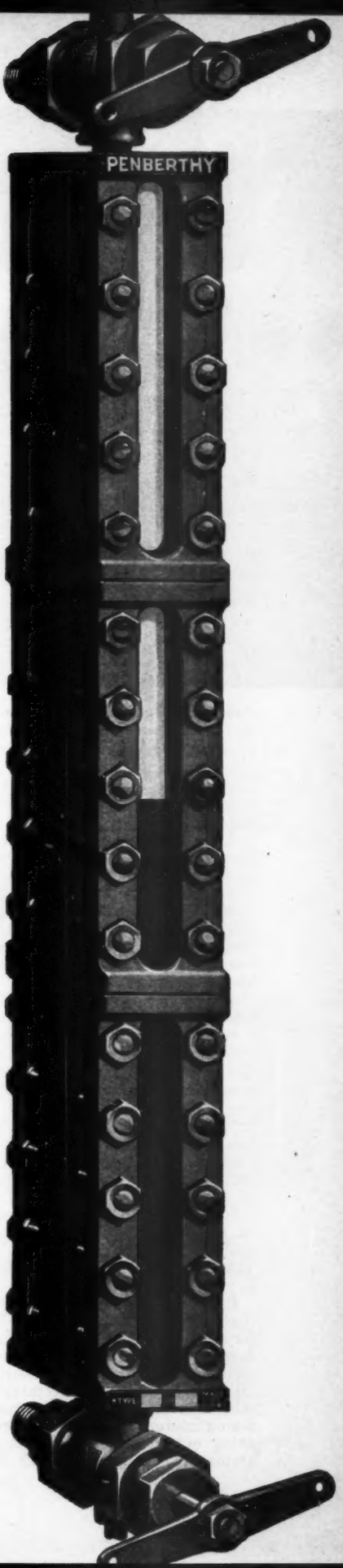

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Catherine Taylor and Christabel Hewitt at the control panels of experimental stills used in analytical distillation

duration job only. Dependability was stressed as the prime requisite for the work.

After the women hired were fitted into actual production they worked under the guidance of foremen and experienced operators.

What has been the result of Gulf's employment of women in its laboratory field? (It should be borne in mind that these women work on a shift basis, and like all other industrial employes in the Port Arthur area, put in 48 hours a week.)

"Generally," say company officials, "the arrangement has been as satisfactory with that many women as it would have been with an equal number of inexperienced men.

"Records indicate that absenteeism has been higher among women, however, and the company has been forced to grant an unusual number of leaves.

"Of 73 women originally employed in the laboratory, 15 have left the company since the program began. This 20 per cent loss is attributed to a variety of causes."

It is encouraging to note, however, that the great majority of the laboratory women technicians are capably carrying out their assignments. Materials tested in the laboratory range all the way from the incoming crude oils, through the various phases of manufacture, to the finished products going out for essential military and civilian consumption. Quick to develop laboratory technique, these women are rapidly becoming qualified to take a vital part in this program.

Thus, through the upgrading of male employes, and the employment of women, Gulf has been able to solve very satisfactorily at least some phases of its personnel problem.

The continued high rate of production of this plant is due in part to the fact that most of the employes have a member of the family in service and share the common desire to work hard and end the war as soon as possible. And it is due in considerable part to the efforts of the women who are diligently serving this company and their country in a vital capacity during wartime.

New Elk Hills Contract Is Expected Within 3 Months

WASHINGTON, D. C.—A plan for protecting the Government's interests in the controversial Naval Petroleum Reserve No. 1 in Elk Hills, California, is expected to be approved by the House committee on naval affairs within the next 3 months.

A new contract between the Navy and Standard Oil Co. of California for a unit plan of operation of the field has been laid before the committee with the suggestion that Congress either authorize execution of this contract or direct that Standard's interest be acquired by condemnation. Meanwhile Standard and the Navy have continued for 90 days a temporary working agreement which was scheduled to expire December 8.

This temporary agreement and the proposed new contract differ considerably from the original contract of November 20, 1942, which was canceled by the Navy because of the objections from the attorney general and the secretary of the interior. Attorney General Francis Biddle, appearing before the House committee December 8, said he was not prepared to state that the proposed unit agreement is not authorized by law, but he suggested legislation specifically authorizing it if Congress should prefer this to condemnation. He also suggested a number of modifications in the contract.

The Navy Department stated that the new unit agreement removes the features of the prior contract which were the subject of criticism. It conserves all of the Government's oil in the ground unless and until Congress authorizes production of that oil, and gives the Navy control over the production of a very large part of Standard's oil. In view of the urgent need of oil for war purposes on the West Coast, the Navy agrees to permit production by Standard of 15,000 bbl. per day, on a quarterly average, during the primary period, defined as the shortest of (a) until 6 months after cessation of hostilities, (b) until Standard has recovered 25,000,000 bbl. from the shallow zone, or (c) until Standard has recovered from the shallow zone one-third of its share of the estimated recoverable oil.

Standard will pay all current drilling and operating expenses but ultimately these will be allocated between Standard and the Navy in accordance with their respective interests. The Navy will control all operations in the reserve, and neither party has exclusive rights to purchase the other's oil.

Draft of legislation authorizing this unit-operation contract will be submitted by the Navy shortly, and the House committee plans to hold open hearings on it early in January.

The Justice Department has leaned toward condemnation of Standard's property as the best way to protect the Government's interest in the reserve, but Attorney General Biddle pointed out to the committee that under existing law the Navy would have no authority to operate the reserve if condemnation were carried through, and this would mean closing down present production there of 15,000 bbl. per day.

Pan American Posts Prices in Two Fields

HOUSTON, Tex. — Pan American Production Co., Houston, last week posted prices for Alta Loma and Chocolate Bayou crude oil. The Alta Loma schedule, effective November 1, starts at 98 cents per barrel for 20-gravity oil and carries a 2-cent differential for each higher degree up to $1.40 per barrel for 40 gravity and higher.

Chocolate Bayou crude was posted at 95 cents for 21-gravity oil and a top of $1.35 for 40 gravity and higher at increments of 2 cents for each degree. The field posting becomes effective with the first runs to Pan American Pipe Line Co. facilities.

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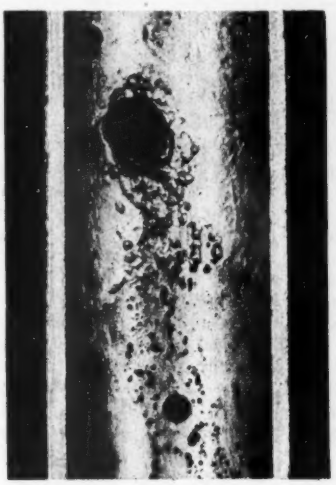
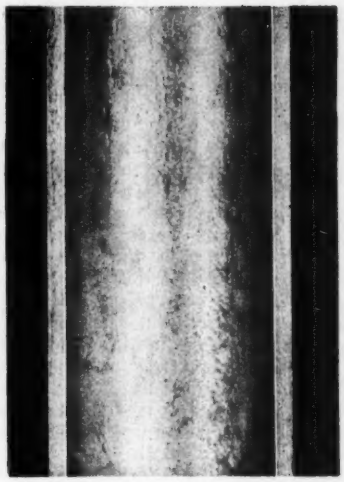


PLAIN ADMIRALTY
This Tube failed from dezincification.



ANTIMONIAL ADMIRALTY
This Tube still in good condition.

The tubes illustrated above were taken from the same heat exchanger bundle. Both were in service the same length of time.

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Equipment and Materials for New Processes Shown at Exposition

NEW YORK.—The crush of new processes and the methods and means to carry them out on a large scale were shown conclusively by the number of new and improved methods, materials and equipment shown here December 6-11 at the nineteenth Chemical Exposition.

New and special filter aids, catalyst raw materials and catalyst carriers, coated and protected equipment for handling corrosive and/or erosive fluids, special packings for fractionator towers, meticulous control systems, nonmetallic, resinous and other special materials for special products, all these represent some of the more interesting and useful items exhibited in the exposition.

Researching on Catalyst Carriers

One of the newer fields in which many large companies are interested is that of catalyst and carriers for catalysts for the petroleum and chemical industries. Dehydrogenation catalysts, for example, are prepared by depositing a solution of a salt of the active catalytic metal or material on a relatively inert or slightly catalytic carrier or base, later evaporating the solution and oxidizing or reducing the metal in situ.

Two relatively new and most useful types of fractionating tower packings, for either laboratory or industrial chemical and similar applications, are fiberglas and the Stedman type of formed metal-gauze packing. Fiberglas made up of thin spun glass fibers parallel to each other, or without regular arrangement, is now used in columns of large commercial sizes, packing in with fibers horizontal, or vertical, packed down with retainer screens to give reportedly high fractionation efficiency. The weight of this packing averages 3½ lb. per cu. ft., with 135 sq. ft. of surface per cubic foot of material. This type of glass is used in many ways, as heat insulation, fire proofing, etc.

The Stedman type of packing, used especially for laboratory purposes, is a specially designed material made by stamping and punching wire screening of different meshes, wire sizes and metal compositions. Horizontal, punched sheets in the form of a succession of perforated pyramids, or as a series of matched, inverted or opposed cones, are spot-welded into interconnected units to fit columns of different diameters. Perforations are staggered in the length of a column so as to avoid channeling and to give maximum liquid-vapor contact.

Outstanding also at the exposition was the variety of special products available for construction of units handling corrosive or other special materials. For example, a centrifugal pump built entirely of ceramics materials for handling concentrated acids such as sulfuric; another pump entirely of glass, or of fused quartz, including bearings; still another lined completely with hard or semihard rubber, for special purposes; yet another of steel lined completely, even to connections with piping, with glass, a setup now being considered for refinery special process applications. Methods for connecting and bracing glass piping have been perfected to the point that units entirely of glass are now fabricated.

Resinous and resinoid tubing and piping are becoming available in rapidly increasing variety, the lucite, saran, tenite and other types of transparent, translucent and opaque materials lending themselves to a great number of uses. Another unique development noted is that of a spiral heat exchanger, in which parallel conduits are wound in cylindrical form covered by a jacket and permitting a high rate and quantity of heat exchange in very small space.

Incident to the meeting the Sixth Biennial Achievement Award in chemical engineering was made to the synthetic-rubber industry on December 8 at a dinner at the Waldorf-Astoria. The list of firms so honored included 25 oil companies and subsidiaries, and 10 or more engineering and development companies interested and active in this field.

DEATHS

John T. Moore, 66, oil operator who went to Indian Territory in 1904, died December 7 in his home in Muskogee, Okla. Moore joined the Dawes Commission in 1906 and was employed by the Five Civilized Tribes Indian Agency until 1919, when he resigned to enter the oil business. For 15 years he represented large oil companies and independent operators in Tulsa.

Eugene N. McNutt, 66, who was an independent oil operator in Houston and Iola, Tex., died last week at his home in the former city.

Bartlett D. Moore, 62, vice president of Emperor Oil Co., Fort Worth, Tex., died December 9 in Galveston, Tex., his home. Besides his oil interests he was president of Moore Lumber Co. An enthusiastic golfer, he had placed in many state tournaments. C. H. Moore, Fort Worth oil man, is a son.

Peter B. Cunningham, 83, credited with drilling the first well in the Glenn Pool of Oklahoma, died December 8 in Ponca City, Okla., at the home of a son, George F. Cunningham.

Ted Spencer, 42, oil-well drilling contractor of Wichita, Kans., died December 9 in a hospital in that city following 3 months' illness.

Robert E. Wyche, 81, early Louisiana oil operator, died last week in Shreveport. When oil was discovered in North Louisiana he engaged in operations in Bossier Parish, where he then resided, and in adjoining parishes. The original Bellevue oil well in Bossier Parish, drilled in 1921, is on his holdings.

Arthur W. Lawrence, 62, secretary and director of United North & South Development Co., died December 10 in Luling, Tex.

James P. Richards, 83, veteran employe of Standard Oil Co. of New Jersey, died December 7 in Hackettstown, N. J. Born in England, Richards came to this country with his parents and in 1866 went to Oil City, Pa., to reside. He attended school there and later was employed in the office of Imperial Oil Co., a refining subsidiary of Standard. When the refinery was dismantled he was transferred to Standard's office in New York, where he remained for 30 years.

Lovic P. Garrett, 63, vice president in charge of geological enterprises of Gulf Oil Corp., died December 13 at his home in Houston, Tex. Born in Glenn, Ga., Garrett had lived in Texas from boyhood. He attended University of Texas and left it in 1903 to become assistant geologist in Rio Bravo Oil Co.. In 1907 he quit to become a scout and lease man for J. M. Guffey Petroleum Co. and Gulf Refining Co. From 1909 until 1912 Garrett was assistant to the superintendent of production of the two companies, and superintendent from 1912 until 1918. In 1919 he became consulting geologist for the Gulf companies, and in 1921 to 1928 he was assistant to the president of Gulf Production Co. In 1929 he was elected a vice president. Garrett was an authority on the geology of Texas. He served as president of American Association of Petroleum Geologists in 1931. Glenn L. Garrett, Fort Worth, Tex., head of Gulf's land and production department in the West Texas division, is a brother.

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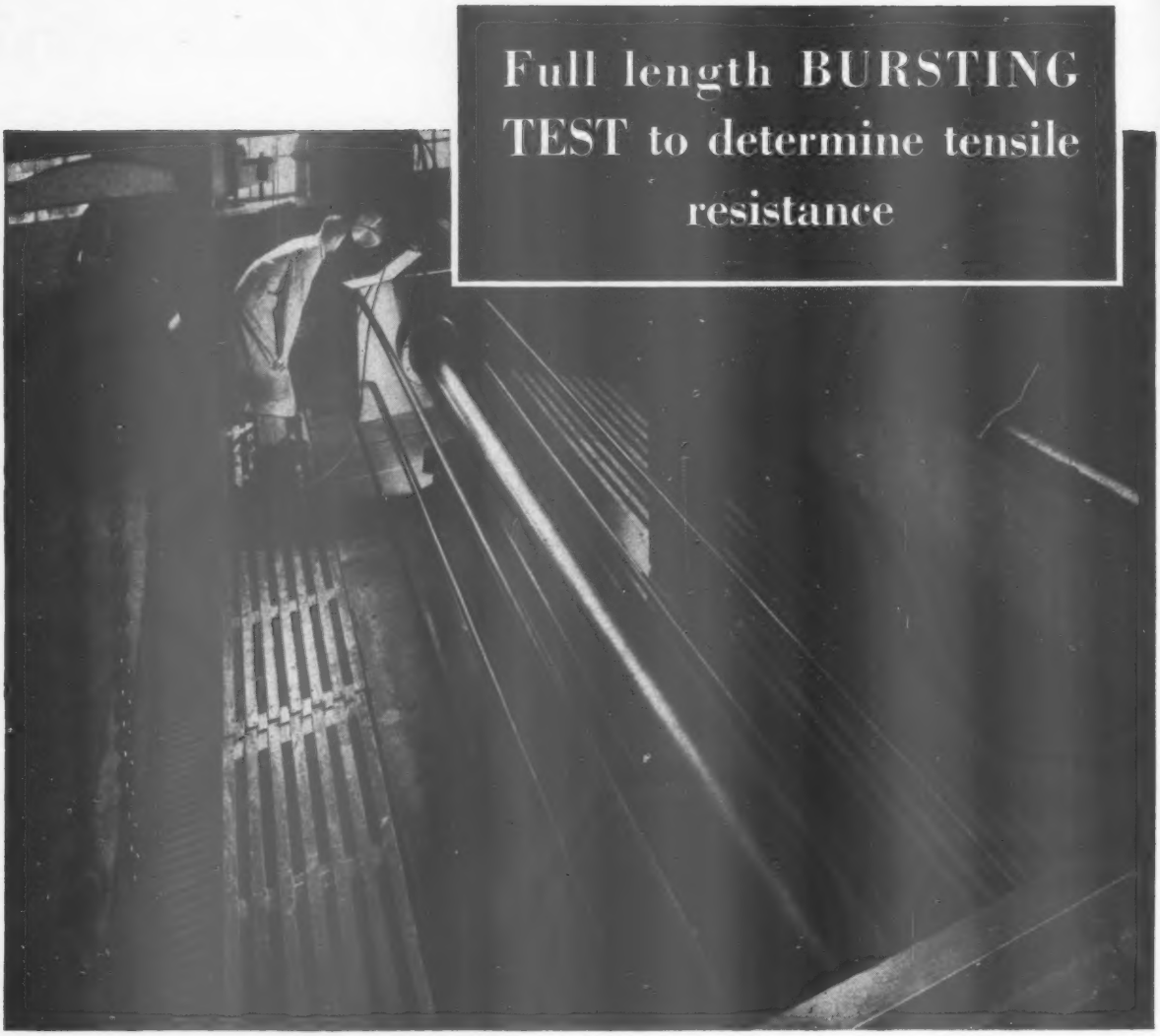


Cast iron pipe has been a helpful "Jack-of-all-trades" material from the standpoint of the petroleum industry. Just a good, honest and reliable corrosion-resistant pipe for all-around service. But now you might be surprised. Cast iron pipe has gone through a war-change. The bursting strength is greater for the same wall-thickness. Other improvements have been effected and are in the making. So when you can get necessary priorities, you will get better cast iron pipe than ever. Cast Iron Pipe Research Association, Thomas F. Wolfe, Research Engineer, 1015 Peoples Gas Building, Chicago, Ill.

CAST IRON PIPE

For Longer Life and Economy

Two Shell-Developed Processes Aid in the Production of Toluene

by J. P. O'Donnell

Production of toluene from petroleum has been started since the opening of World War II. The combined output from natural extraction plants and synthetic units now exceeds several times over the production of the entire coal-tar industry, which formerly was the exclusive source of supply. Much of this production is from processes developed by Shell Oil Co., Inc.

WHEN World War II began 4 years ago, the United States was dependent entirely on the coal-tar industry for its supply of toluene. The production of this commodity in 1939 amounted to approximately 20,000,000 gal., all of which was required for peacetime purposes. Since production then represented a large part of the capacity of the coal-tar industry and since much greater demands were in prospect, it was apparent that development of other sources of supply would be necessary.

Shortly after the United States entered the war, it was estimated that demand would reach the tremendous total of 100,000,000 gal. per year, five times the production of the coal-tar industry 3 years before. This total was subsequently revised upward but even with the later increases, requirements were met by resorting to a new source material, petroleum, certain types of which contain recoverable quantities of toluene and fractions from which toluene concentrates can be produced synthetically.

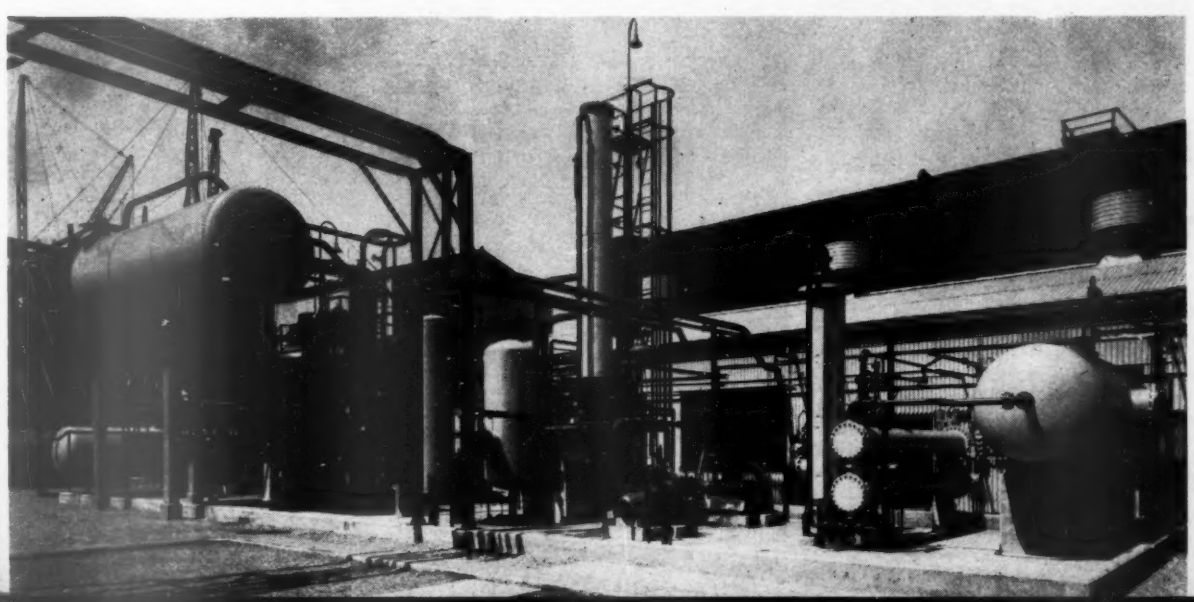
Use of petroleum for the manufacture of toluene was suggested in part by the fact that it had been used for this purpose to a limited extent in the first World War. However, virtually all of the toluene required then and since was produced by the processing of coal tar.

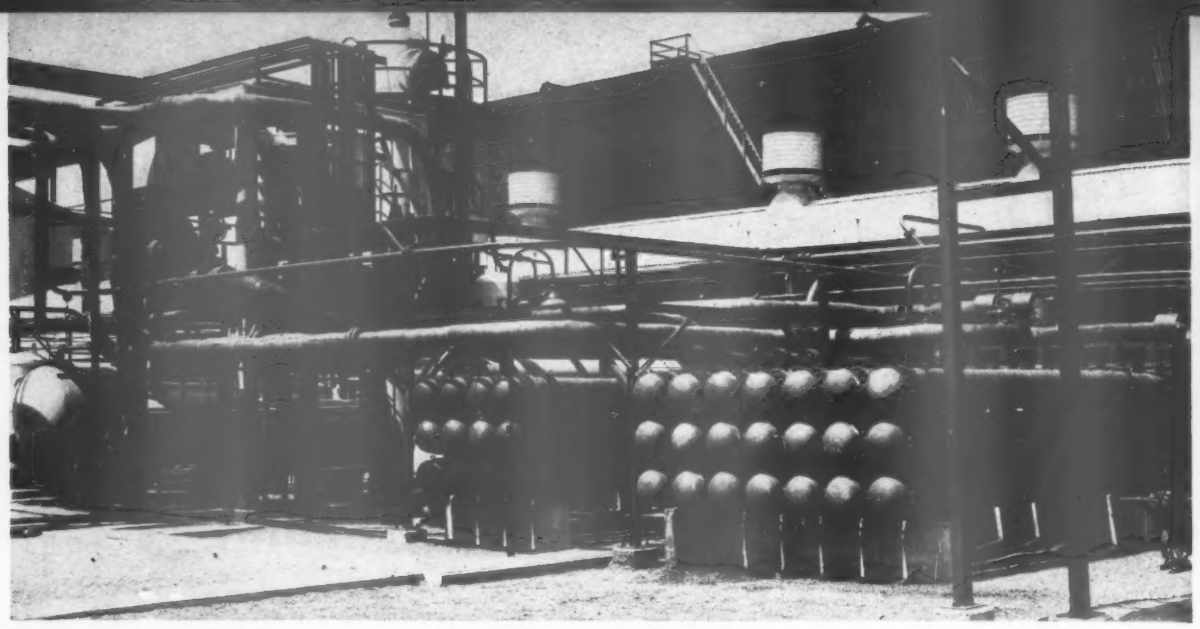
The first commercial unit for the production of toluene from petroleum in this country during the present war was completed by Shell Oil Co., Inc., at its Houston, Tex., refinery a full year before Pearl Harbor. Five months later construction of a duplicate unit was started at the same refinery and, 8 months after the first was undertaken, a third was begun at another refinery. When first planned, the Houston plants had a rated capacity of 4,000,000 gal. per year.

All three units employed an extractive distillation process developed by Shell which is capable of recovering toluene existing as such in crude oil as well as that produced in cracking or reforming operations. This process since has been licensed by a number of other refiners for the purification of toluene concentrates obtained from natural and synthetic units.

The amount of toluene naturally present in crude oils is very small, ranging from as little as 0.3 per cent in East Texas crude to as high as 2

Isomerization unit for converting dimethylcyclopentane to methylcyclohexane

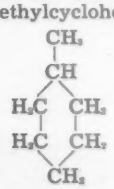




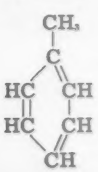
Battery of high-pressure heat exchangers

per cent in Conroe crude. Tests of a representative California crude showed a content of 0.65 per cent. It is impossible to recover the naturally existing toluene from straightrun gasoline by known methods or even the still greater quantities existing in cracked or reformed gasoline by ordinary distillation methods. This is due to the existence of other hydrocarbons of approximately the same boiling point. Specifications for nitration-grade toluene limit the boiling range to 1° C. range, which includes the boiling point of pure toluene. The exacting nature of the distillation involved is apparent from the fact that the product is very close to 100 per cent pure toluene.

Because the volume of toluene naturally existing in oil is insufficient for economical recovery, the production of synthetic toluene was undertaken by the oil companies. It was well known that toluene, an aromatic, could be produced through the transformation of other hydrocarbons by aromatization. The industry was acquainted with the chemical reaction by which methylcyclohexane,



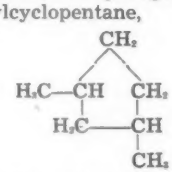
may be dehydrogenated to produce toluene:



There are several tolune-from-petroleum plants now in operation which use this procedure. They employ the hydroforming process which was designed originally for the purpose of reforming low-octane, heavy naphtha to a high-octane gasoline. The product of this operation is high in aromatics content. This content, in normal operation, was reported to range from 40 to 60 per cent, of which 15 to 20 per cent was toluene. Revision of operating conditions and modification of design made it possible to increase the yield of toluene by this method.

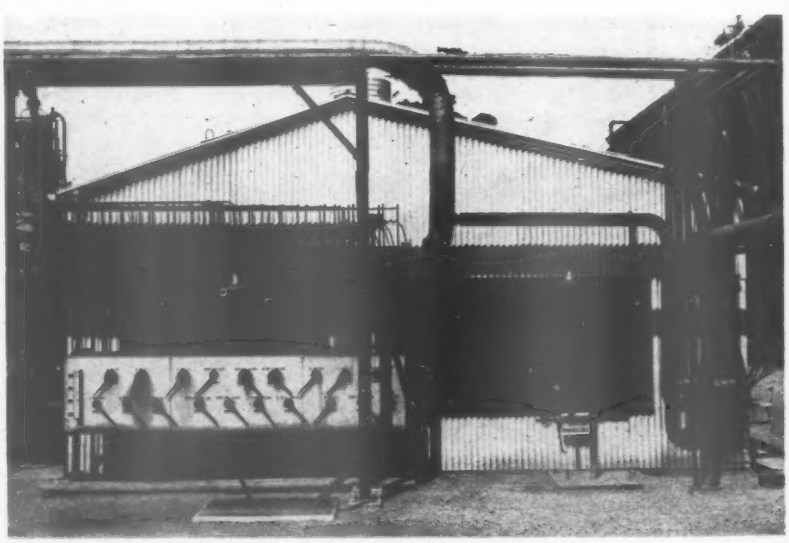
This was the first process to be used principally for the production of synthetic toluene on a large scale and plants using this method have been erected while others, built originally for processing naphthas, have been converted to toluene production. Actually the product of this operation is a toluene concentrate which must be purified. A majority of the purification plants in this country employ Shell's extractive distillation process for the final step.

Just as it is possible to increase the yield of toluene from petroleum by dehydrogenation of methylcyclohexane, it is possible to increase the proportion of methylcyclohexane and thereby add to the volume of material susceptible to dehydrogenation. Thus dimethylcyclopentane,

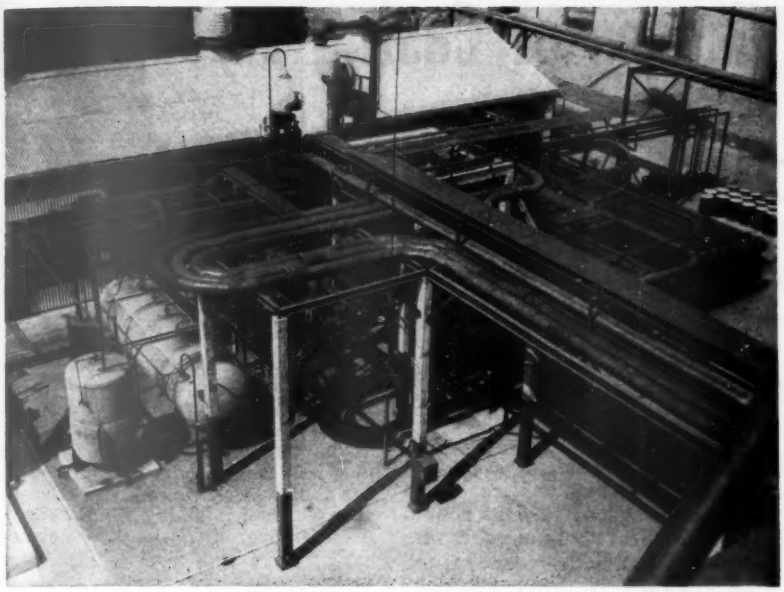


can, by isomerization, be converted into methylcyclohexane and the latter, by the process of dehydrogenation, into the toluene concentrate.

While there is little mystery in-



Emergency blowdown system



Heat exchangers and compressor house

volved in these chemical reactions, the development of a process which would be capable of accomplishing them and which would be economically practicable, presented a real challenge. Shell Development Co., an associate of Shell Oil Co., Inc., developed such a process and units employing it have been installed at selected Shell refineries in the Mid-Continent and in California.

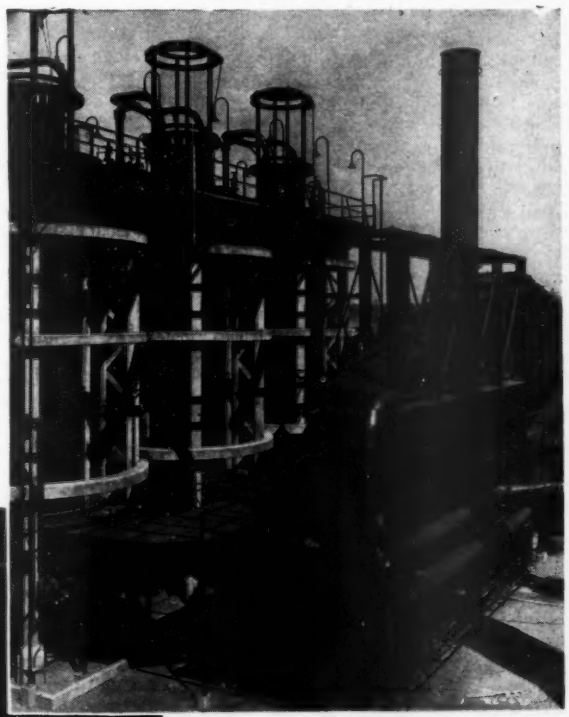
The dehydrogenation process, like hydroforming, is catalytic. The nature of the catalyst, the shape and dimensions of the vessel in which the reaction takes place and the operating conditions of time, temperatures and pressures are restricted information and, doubtless, will not be disclosed until after the war. Details of this process and those of the extractive distillation process for purifying concentrates are available to toluene petroleum operators through the Toluene Technical Committee of the Ordnance Department of the U. S. Army.

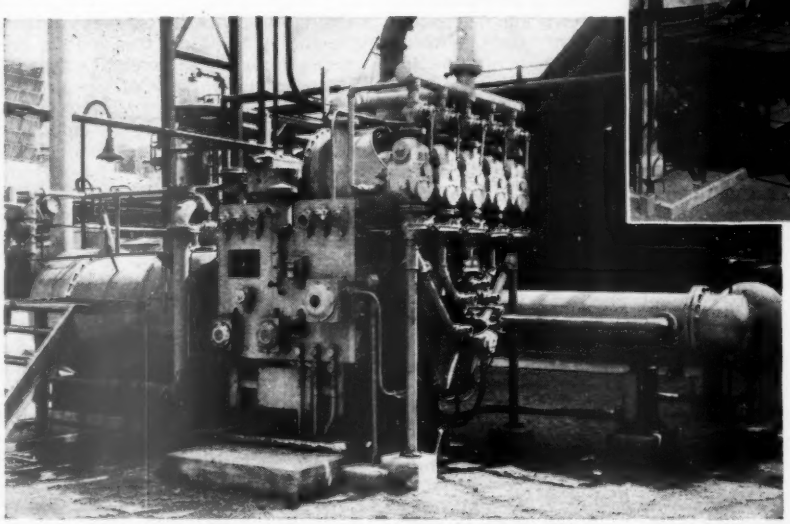
The charge for the dehydrogenation step is a fraction rich in methylcyclohexane with a boiling range of, roughly, 200° to 250° F. As in practically all refining processes, it is heated before passing to the reactors. Vaporization takes place in a separate preheater. The processing is done on a once through basis though, as in hydroforming, part of the hydrogen is recycled with fresh charge.

One of the distinctive features of the process is the fact that catalyst activity is maintained for months and the degree of activity remains high. As a result of finely controlled operating conditions cracking of the charge is prevented and thus there is virtually no carbon deposit on the catalyst. This accounts for the continued high catalyst activity. When regeneration is found desirable, it is accomplished in place by a comparatively simple method that varies from the commonly accepted practice of burning the catalyst.

The precise temperature control which is essential to successful operation is attained through the use of a special furnace which was designed and built by Foster Wheeler Corp. on the basis of long experience in the field of petroleum engineering. The charge is heated by convection gases only. Foster Wheeler also built many of the extractive distillation units employing the Shell process.

By combining the production of its extraction plants with that of its synthetic units, Shell Oil Co., Inc., is now producing far more toluene than the entire coal-tar industry.





Above: Foster Wheeler designed furnaces with common convection heat-removal system

Left: Inert gas generator at Shell toluene plant

Mechanical Causes of Casing Failure And Practices for Their Control

*by Lawrence O'Donnell and W. S. Crake**

In view of casing failures which occur largely from causes which are not fully determinable, this article has been prepared to set forth the main factors tending to cause damage to oil-well casing strings. Certain recommendations are made covering practices which should tend to reduce damage to casing strings, some of which practices are now followed by operators and some of which are not.

SINCE all operations of drilling are conducted through the surface casing and since it is generally the only safety provision below the surface for withstanding blowouts, exceptional care should be taken with both the installation and use of this string. Precautions should particularly be taken in wells that require long periods of drilling operations through the surface casing.

Failure Through Wear

One of the most predominant causes of damage or hazard to the surface string is that of wear by drill pipe, particularly if the surface string is not vertical in the well. This wear is caused by the abrasive materials in the drilling fluid, such as sand, rubbing between the rotating drill pipe and the casing. With off-vertical casing, this wear always occurs on the side of the well towards which the drill pipe is pulled by the load below or by the off-center position of the derrick above. With metal-to-metal contact, the wear area is heavily concentrated and, since abrasive wear is proportional to the area in contact, the intensity of loading and the abrasive quality of the drilling fluid, rapid wear of the casing may occur on the contact area. On deep wells, the great weight of drill pipe hanging below the surface string increases the horizontal component of lead causing wear on casing and, similarly, causing keyseating in open hole.

To reduce wear, it is quite essential when drilling oil wells to use rubber protectors on the drill pipe operating inside casing. The use of sufficient rubber protectors increases the contact area greatly and also permits abrasive materials to be cushioned by the rubber, thus materially reducing the wear on the casing string, and on the drill pipe. Each joint of drill pipe operating inside of casing should have at least one rubber protector installed on it, spaced about 2 ft. from the tool joint. Rubber protectors can be sufficiently worn to the point where they provide no protection. Consequently, it is also advisable to periodically check the outside diameter of the protectors to insure that they are at a minimum of ¼ in. larger in diameter than the tool joints on the drill pipe.

*Shell Oil Co., Inc.

Due to wear it is highly probable that a large proportion of surface strings on deep wells, which are not exposed to high internal pressures or collapse forces under normal drilling conditions, would fail in collapse if emptied, or from bursting if excessively high pressure were imposed thereon.

Failure under pressure generally causes bypassing of pressure around the back of the casing and consequent "cratering." Difficulty of obtaining a good cement job in back of the surface casing because of washing of hole, channeling, and contamination of cement, also adds to the hazard of cratering. Channeling of cement is greatly increased by the relatively low cement velocities obtained in larger-diameter holes generally used for surface casing.

In order to provide greater resistance to wear, a better grade of casing is sometimes mistakenly used. Within the range of hardnesses obtainable in casing, one grade will not last against abrasion appreciably any better than another and an increase in grade to prevent wear is wasted expenditure. Use of additional thickness of metal is a much more suitable method of providing additional wear resistance but the best method of reducing wear is to have the surface casing set vertical. No wear can occur in casing set perfectly vertical and if the drill pipe is run in the center of the top joint. These requirements are difficult to obtain in actual practice, consequently, rubber casing protectors are used to provide additional insurance against wear.

Failure Through Structural Loading

The surface pipe also serves as the column support for the other tubular strings which are to go in the well. As a column, commonly used, 40.50-lb. 10¾-in. surface casing will, without outside support, stand only about 35 ft. in length with a column load of around 62,500 lb. This casing will, in the H-40 grade, however, stand safe loads of 400,000 lb. in direct compressive load if amply supported by the walls of the well and it does not exceed an unsupported length of 14 ft. projecting from the ground.

If the casing is not properly supported by the sidewalls of the well, by cement or cavings, kinking will quite probably occur from column loading if the weight of the string is rested on bottom and if cavities of sufficient length and diameter are present in the well. Under the above conditions, 10¾-in. 40.5-lb. casing will kink if the hole is washed out to about 24 in. diameter over the length of one joint. Since column-load capacity depends on the modulus of elasticity of steel, the safe unsupported column length of casing is not affected by the grade of steel used. It is impossible to predict from the surface what cavity conditions exist in a given well bore to cause kinks. This suggests that caliper surveys should be run on the first wells drilled in a field to obtain information on surface casing hole diameters and cement requirements.

Poor Well Foundations

On land locations in many areas, particularly the Gulf Coast, it is impractical to carry the weight of casing strings on the surface of the ground by means of concrete spread footings or steel flanges. Early attempts to provide collars with sufficient load-bearing capacity were also unsuccessful. Consequently, the general practice has been to carry the entire suspended load of casing on the surface string as a column. In order for this practice to be successful the surface casing must be immovable, that is, there must be adequate sidewall friction on the casing to transmit the load to the formation, and the casing must have lateral support from the cement or cavings to transmit the load axially down the casing.

Whenever the surface formations are reasonably firm and the surface casing is "frozen" or caved in and the casing is also well cemented at

bottom and cemented around the top, the above result is usually achieved. The lateral support required at any point is extremely small if the casing is held reasonably straight.

However, in marsh operations, as found in certain coastal areas, the surface marsh sediments do not provide proper lateral support. To insure the best results, in this case, the surface casing should be either cemented up to the surface or should be cemented inside the conductor pipe for as long a distance from the surface as practical. While drilling, the casing or drilling christmas tree should be firmly braced onto the drilling substructure or marine rig to prevent settling of the casing by vibration.

After being set, there exists danger of damage to the casing at the surface by column loading, when setting the heavy oil string thereon. If the upper portion projecting above ground is longer than 12 ft. or so it is advisable to brace the casing against lateral movement. Likewise, the casing should be firmly imbedded into the ground at ground level by filling any surface cavities with cement. If the cavities are large, shell or sand may be used.

Summarizing this point, ample support for long casing strings can be given by surface casing of 10¾-in. o.d. in water up to 12 ft. deep if it is cemented or supported to the soil-water contact level. Deeper water on marine-well location will require larger-diameter conductor or surface support casing. Any tendency for the surface casing or christmas tree to sway after removal of drilling bracing should always be remedied as soon as possible by cementing, bracing to piling foundations, or other means.

Casing Strings—General

Casing strings only have predictable characteristics when in tensile loading in a well. Strings have no strength in compression unless supported by the well walls. The larger the free diameter of the hole in which the casing is installed, the lower is the column load capacity of the string without danger of permanent damage to the casing.

There is no way to determine which wells can stand having the casing placed in compression except in solid limestone drilling where the walls are usually almost true to gage. It is, therefore, an unsafe practice, especially on deep wells, to place any considerable portion of the casing in compression. A short cavity of enlarged diameter, combined with hard shells in the formation, may provide leverage to cause a kink in the casing if compressive loading is permitted.

Even when the casing is in tension, a one-sided sloughing off of formation in a cavity may cause the kinking of a casing string if the leverage and cavity spaces provide room for the casing to be deflected past its elastic limit. This might happen long after a well is completed and may account for certain failures after completion.

Failure Due to Temperature Effect on Long Strings of Casing

Unless precautions are taken, column buckling failure can occur to casing strings due to temperature expansion of the string caused by flow of hot oil.

One method of hanging casing consists of:

1. Locating the "freeze point" or point below which the casing is "frozen" after cement is set, as shown in Chart 1.

2. Considering that the natural stretch in the casing as it hung in the well at cementing time is permanently "frozen" below the "freeze point" and that the "free" portion of the casing at the upper end can be considered as a separate casing string.

3. Letting off part of the stretch which was in the upper portion of the string when it was hanging as part of the entire length. The amount of stretch left in this upper portion is equal to the natural stretch if considered as a separate string, plus an additional amount of 2½ in. per 1,000 ft. of "free" pipe. This latter "extra" is to take care of temperature expansion, providing stiffness against vibration, and errors in determining freeze point. The amount to slack off before suspending the casing on the casing head is obtained from Chart 2.

The above method is satisfactory for wells up to 11,000 ft. having up to 250° F. bottom-hole temperature. The attached tabulation shows what may possibly happen in a 12,000-ft. well when bottom-hole temperature is 310° F., freeze point is at 4,000 ft. and the casing hung in accordance with this method.

(a) The lower end will normally be in little danger from temperature effects since thermal expansion is always less than natural strain frozen in.

(b) The upper or "free" end is subjected to the greatest temperature strain and may be forced into compressive load over its entire length. The example given is about the worst possible condition since no radiation of heat to the formation is assumed and this radiation actually always occurs in practice to an unknown extent.

It can be seen that the higher up the casing the freeze point occurs, the greater the temperature strain on the upper section becomes. However, once inside 10¾-in. casing, 5½-in. casing will normally support about 4,000 ft. of its own weight without danger of permanent kinking. This is due to the known restrictions of nateral movement placed on the 5½-in. by the 10¾-in.

It may be concluded that the above method of hanging casing leaves suf-

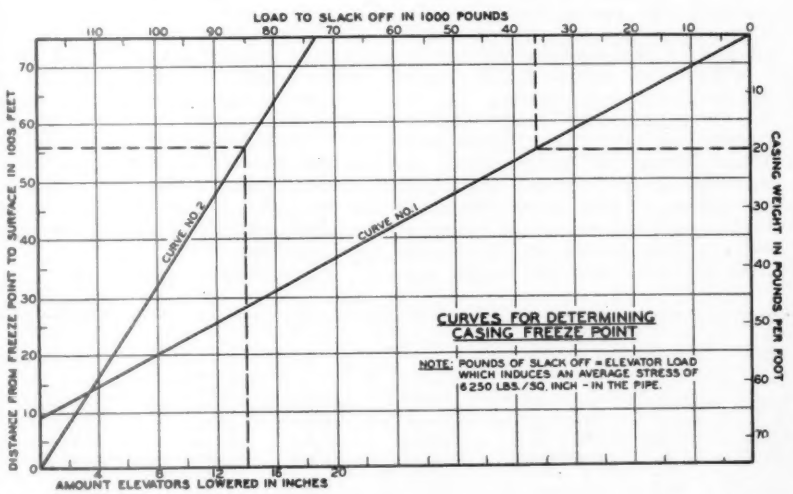


Chart 1

METHOD OF USING CHART 1 TO DETERMINE SUSPENSION POINT OF CASING STRINGS

This chart is based on the fact that, if a certain stress change is made in a free-hanging string, or portion of a string, of casing fixed at the lower end, the amount of strain produced by this stress is directly proportional to the length of pipe down to the point at which it is fixed, or "frozen." Since long casing strings are usually heavily loaded in tension at the upper end, it is advisable to reduce load from the full pipe weight rather than to add load.

Example: First, pull on casing until weight indicator reads full weight of entire casing string as shown before cementing. Mark casing about 3 ft. above rotary table.

Second, see curve No. 1: If average weight of casing string is 20 lb./ft., lower weight on indicator by 36,500 lb., and measure the amount the above mark has lowered. Assume this is 14 in.

Third, see curve No. 2: Start from lower scale at 14 in., proceed to curve No. 2 and thence to left-hand scale—freeze point is at approximately 5,600 ft. from surface for the 14-in. measurement.

ficient strength in the string to take care of temperature strains under normal conditions. In view of future increased depths and higher well temperatures, it is recommended that the normal 2½ in. per 1,000 ft. compensation strain left in the upper or free pipe be increased to 4 in. per 1,000 ft. on all wells below 1,000 ft., or wells in which bottom-hole temperatures over 250° F. are expected.

It is not considered safe to leave full pipe weight hanging at the surface for the following reasons:

(a) Joints under heavy tension tend to leak under high internal pressure. A safety factor of at least 2.0 on minimum values is desirable after hanging, to prevent leakage.

(b) Contraction of casing from the use of bottom-hole chokes or other cooling effects would likely pull casing in two if full weight were left hanging. At least bad joint leakage might occur and cause cutting out of the joints.

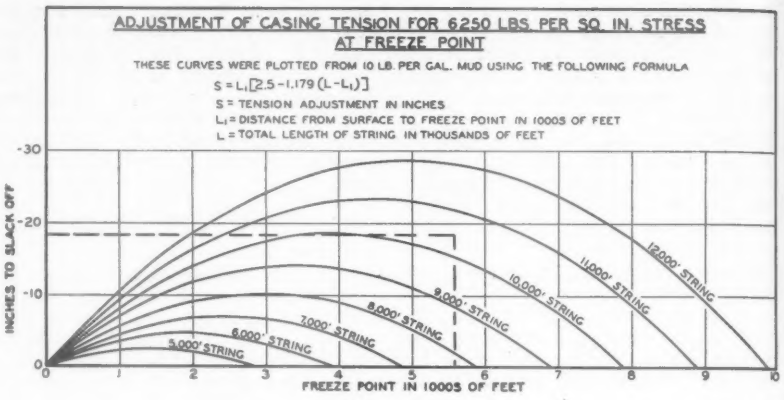

ADJUSTMENT OF CASING TENSION FOR 6250 LBS. PER SQ. IN. STRESS AT FREEZE POINT
THESE CURVES WERE PLOTTED FROM 10 LB. PER GAL. MUD USING THE FOLLOWING FORMULA
S = L1[2.5 - 1.179 (L - L1)]
S = TENSION ADJUSTMENT IN INCHES
L1 = DISTANCE FROM SURFACE TO FREEZE POINT IN 1000S OF FEET
L = TOTAL LENGTH OF STRING IN THOUSANDS OF FEET
INCHES TO SLACK OFF
FREEZE POINT IN 1000S OF FEET
5,000' STRING
6,000' STRING
7,000' STRING
8,000' STRING
9,000' STRING
10,000' STRING
11,000' STRING
12,000' STRING

Chart 2

METHOD OF USING CHART 2 TO DETERMINE SUSPENSION POINT OF CASING STRINGS

Example: With previous example of freeze point at 5,600 ft. and a casing string total length of 10,500 ft., proceed from lower scale at 5,600 ft. to interpolated 10,500-ft. mark, between 10,000 and 11,000-ft. curves, and thence to left-hand scale, giving a reading of 18.5 in. Lower elevators until total distance let off, from original position with the full weight of casing on the hook, is 18.5 in., and hang casing at this point. At this point, all "free" casing in hole should be in tension and the joint at the freeze point stressed at 6,250 lb. per sq. in. This amount of stress should give enough rigidity to the free pipe to withstand vibration of drilling operations, temperature and other operating strains.

Conclusions and Recommendations

The following practices are recommended as methods of insuring the best possible setting and support of casing strings. A number of the practices are at present followed by operators as a routine matter, others are not now used and are recommended whenever possible.

A.—Precautions on Deep Wells—Surface Casing

1. To avoid surface casing wear, especially on deep-well drilling operations, spend additional time drilling the surface hole to be sure surface casing is as near vertical as possible. A maximum deflection limit of not over 1° from vertical is suggested on projected deep wells. This might involve the use of extra heavy starting drill collars and reamers, or stabilizers, while drilling surface hole. It is highly probable that an additional 12 hours, or less, time spent drilling this portion of the hole would be more than enough to insure a vertical surface hole and eliminate a high proportion of damaged surface casing.

2. To avoid excessive washing out of wells, caving and large cavities, use properly treated drilling muds for drilling surface hole whenever possible.

3. Use as large pump volume as obtainable for placing cement to give high velocity of cement and reduce channeling effect behind casing.

4. Never let surface casing rest on bottom prior to cementing. Do not let off weight after cementing until cement has set around surface pipe. When letting off weight after cementing, observe for any sinking of top collar. If this occurs, recement surface or support surface casing at top. Surface casing strings should have at least their full weight supported at the surface during cementing, thereby placing them in tension throughout their length and insuring a vertical string. Casing clamps used for this purpose save rig time.

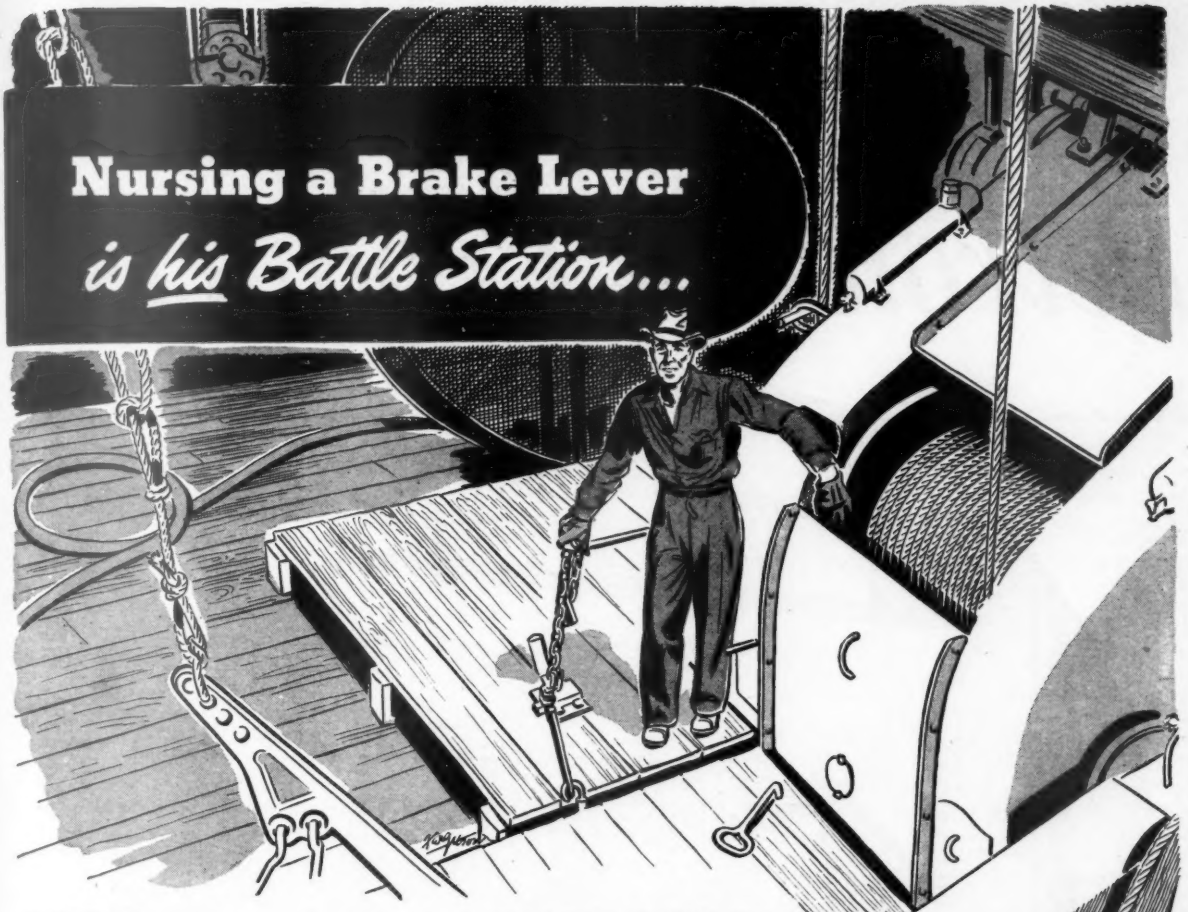
5. To give surface casing maximum support in the hole so that the weight of other casing strings does not kink the surface pipe by column loading, it is suggested that the surface casing be cemented up to the surface if it is reasonably economical. This also prevents vibration and fatigue of surface casing while drilling, gives better chance of sealing off around the casing against possible blowouts and provides firm foundation for the other casing loads. If not feasible to cement to the surface, cement between surface string and conductor as far down as can conveniently be reached with a cementing pipe, but not less than 50 ft.

(Continued on page 58)

TABLE 1

Temperature data						Actual string data*			
Depth 1,000 ft.	Static temp. ° F.	Flowing temp. ° F.	Temp. increase over static ° F.	Average temp. increase ° F.	Exten. in inches at 0.0804" per degree rise	Stretch hanging natural	Stretch left in after setting	Length increase flowing from temp. rise	Residual strain + = stretch — = compression
0	70	145	75	72.5	5.83	14.5	7.0	5.83	+ 1.17
1	90	160	70	67.5	5.34	13.25	5.75	5.43	+ 0.32
2	110	175	65	62.5	5.03	12	4.5	5.03	— 0.53
3	130	190	60	57.5	4.62	10.75	3.25	4.62	— 1.37
					Sub-total frozen	50.5	20.5	...	— 0.41
4	150	205	55	52.5	4.22	9.5	9.5	4.22	+ 5.28
5	170	220	50	47.5	3.82	8.75	8.25	3.82	+ 4.43
6	190	235	45	42.5	3.42	7.0	7.0	3.42	+ 3.58
7	210	250	40	37.5	3.02	5.75	5.75	3.02	+ 2.73
8	230	265	35	32.5	2.61	4.5	4.5	2.61	+ 1.89
9	250	280	30	25	2.01	3.25	3.25	2.01	+ 1.24
10	270	290	20	15	1.21	2.0	2.0	1.21	+ 0.79
11	290	300	10	5	.40	0.75	0.75	.40	+ 0.35
12	310	310	0	0	0	0	0	0	0
					Sub-total		40.1	...	.....
Total					41.62"	91.5"	61.5"	.....	+ 20.29

*Set by standard method shown herein. Frozen at 4,000 ft. 5½-in casing design in 11-lb. mud.



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Fluorographic Analysis of Soil Samples Used in Search for Oil Deposits

by E. H. Short, Jr.

FLUOROGRAPHY, a new method for the quantitative determination of significant hydrocarbons contained in both surface and subsurface soil samples, and a specially developed technique for interpreting the structural meaning of the various degrees of fluorescence observed in the soil samples, has been added to the variety of exploratory aids now being employed in the search for new petroleum reserves on the Gulf Coast.

The new method, which involves the inspection of soil samples and the geophysics of fixed hydrocarbons, should not be confused with the geochemical type of work which involves chemical analysis as a means of determining the amount of free hydrocarbons contained in the soil samples. The laboratory procedure for detecting the amount of free hydrocarbons by the geochemical method depends upon the area under survey. In some cases determinations are based upon weight; in others, depth of sample color, and in still others the content is based upon volume.

During the development of the fluorographic method involving several years of research and experimentation, it was found that all soil samples, regardless of location, contained easily detectable evidence of free hydrocarbons; which, therefore, eliminated such criteria as a significant factor in oil-reconnaissance surveys based upon soil inspection. After exhaustive experimental work, it also was found that an acid-solvent treatment of the samples removed all free hydrocarbons, leaving a fixed hydrocarbon which was consistently found in soil which had been subjected to reservoir leakage over millions of years.

Mechanics of Fluorography

The technique of fluorography has been developed by Fluorograph Exploration Co., of which William Boyd Ferguson, Houston, Tex., geologist, is president. It makes use of specially designed photographic equipment combined with an ultraviolet-light apparatus. Fluorescence analysis is by no means new. Certain variations and modifications of the fluorescence phenomena have been used for some time in refinery analysis and in inspection of drilling fluids. Many substances, if irradiated by radiation of one quality, such an ultraviolet light, possess the power of emitting radiation of a different quality.

Ordinarily the intensity of the radiation given off is quantitatively proportional to the concentration of the substance under observation, and to the intensity of the incident of radiation. Therefore, when various materials are placed in ultraviolet light they give off visible light, and it is possible to determine the concentration of the substance responsible for the light, by comparing the intensities of the emitted radiation.

All hydrocarbons are highly fluorescent, and the combination of photography and ultraviolet light into one device (shown at the right in Fig. 1), permits the recording of florescence eminating from several hundred samples at a time.

Samples are taken by the "grid" method. Preliminary to the field work of obtaining samples, north-south lines 440 yd. apart and east-west lines the same distance apart are drawn on a map of the area to be surveyed. Samples then are taken at the points of intersection, which are numbered, from a depth of 4 ft., with a small auger. Approximately 1 oz. of soil is sufficient for laboratory examination.

First steps in preparing samples for fluorescent examination are dehydration and pulverization. The samples then are placed upon an extremely fine screen and the portion which passes through is subject to an acid-solvent treatment which removes all traces of free hydrocarbons. Small open-end capsules are then filled with the various samples and identified as to location taken, and placed in a tray holding 110 capsules.

Compensation for Errors

The tray then is exposed to the ultraviolet light in the fluorograph. The time required to photograph the fluorescence eminating from the soil samples is approximately 90 minutes. Fig. 2 shows the various degrees of density recorded by the film. It will be noted that standard samples (appearing white) are located among the soil samples. These check samples, which contain no flourescent substance, are used as a means of compensating for errors that are likely to occur because of lense abberation, variable distribution of incident light and solution-temperature variations while processing the film.

Darkening of the film is proportional to the intensity of the emitted radiation. Therefore, the degree of fluorescence eminating from each sample during exposure to the ultraviolet light is determined by a meas-

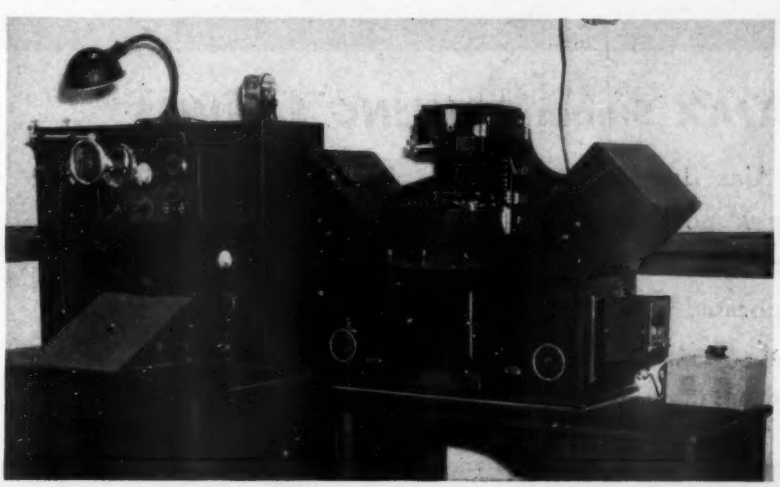

Fig. 1—Laboratory equipment. Densitometer at left, fluorograph at right

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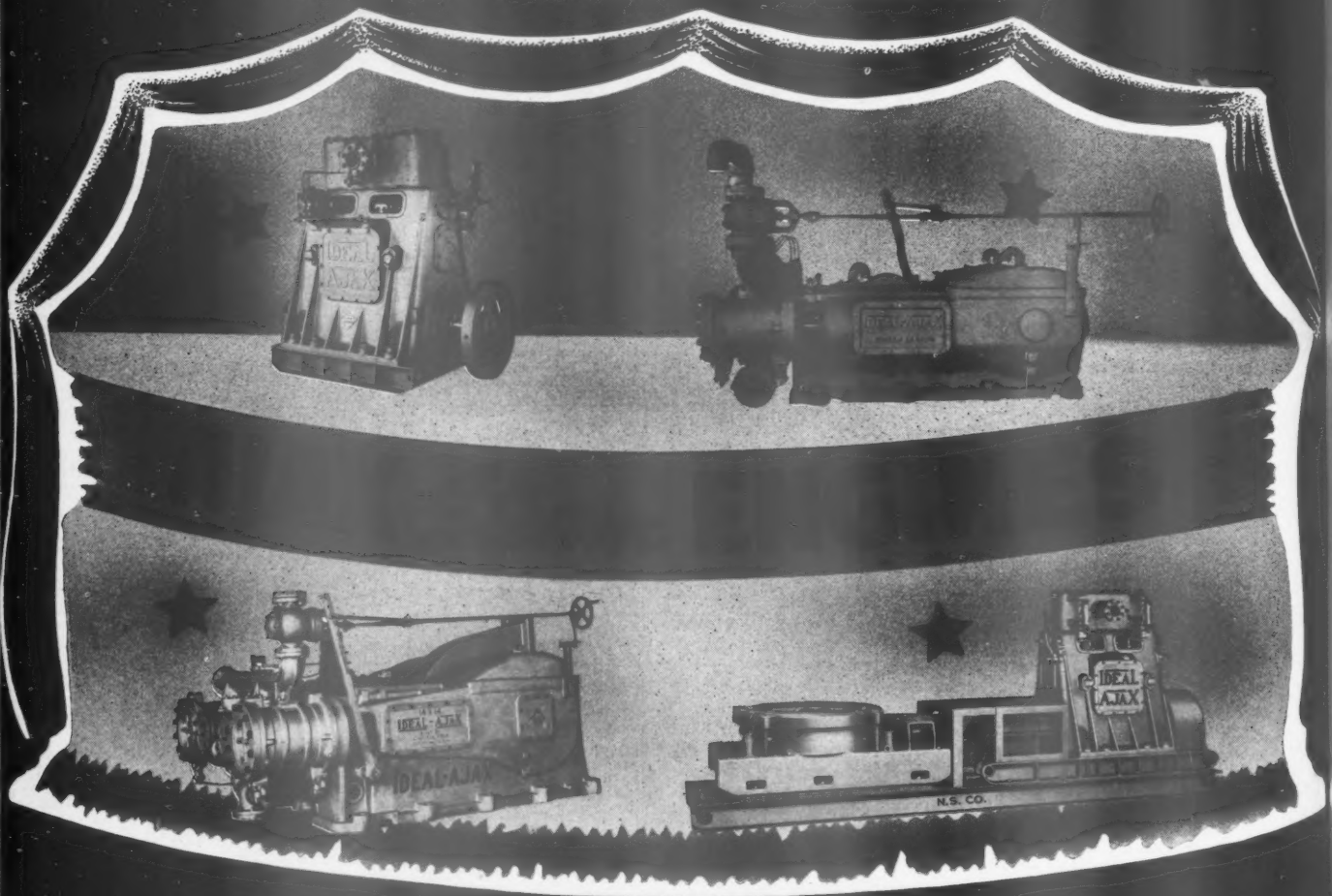

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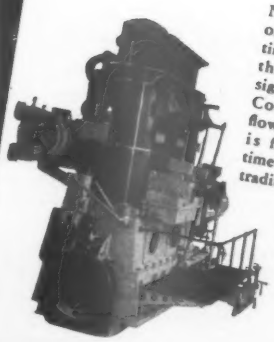

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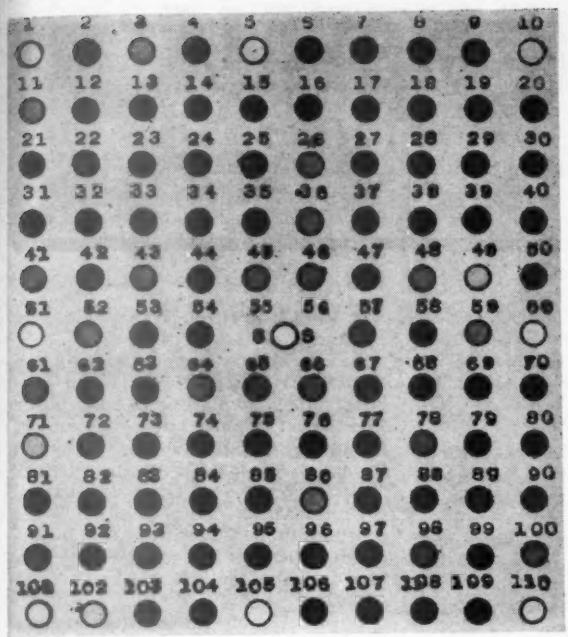


Fig. 2—Photograph of exposed fluorographic film.

urement of the density or light stopping ability of the recorded image. The specially designed densitometer shown at the left in Fig. 1 is used to measure the degree of density of the samples.

Because all soil contains inorganic substances which register some flourescence when exposed under the Fluorograph, it is necessary to use the flourescent quality of all soils as an average background. After the density of the maximum normal background has been determined, the value is subtracted from the density reading of each sample which gives positive and negative readings of the fixed hydrocarbons contained in the various samples. Calcium in the sample may register as much fluorescence as the fixed hydrocarbon itself, and in such cases, where calcium masks the fluorescence of the significant hydrocarbons, it is necessary to remove all traces of this metallic element. The method of making final calculations is illustrated by Table 1.

TABLE 1

Density readings	Normal max. background	Plotted densities Positive	Plotted densities Negative
.60	.30	.30	....
.40	.30	.10	....
.35	.30	.05	....
.30	.30	.00	.00
.25	.30	...	—.05
.20	.30	...	—.10
.10	.30	...	—.20
.05	.30	...	—.25
.00	.30	...	—.30

Application of Fluorography

Fig. 3 is a detailed fluorographic map covering the Hitchcock area, Galveston County, Texas. Samples were taken at 1,000-ft. intervals and the density of the fluorescence readings are marked on the map at the points taken.

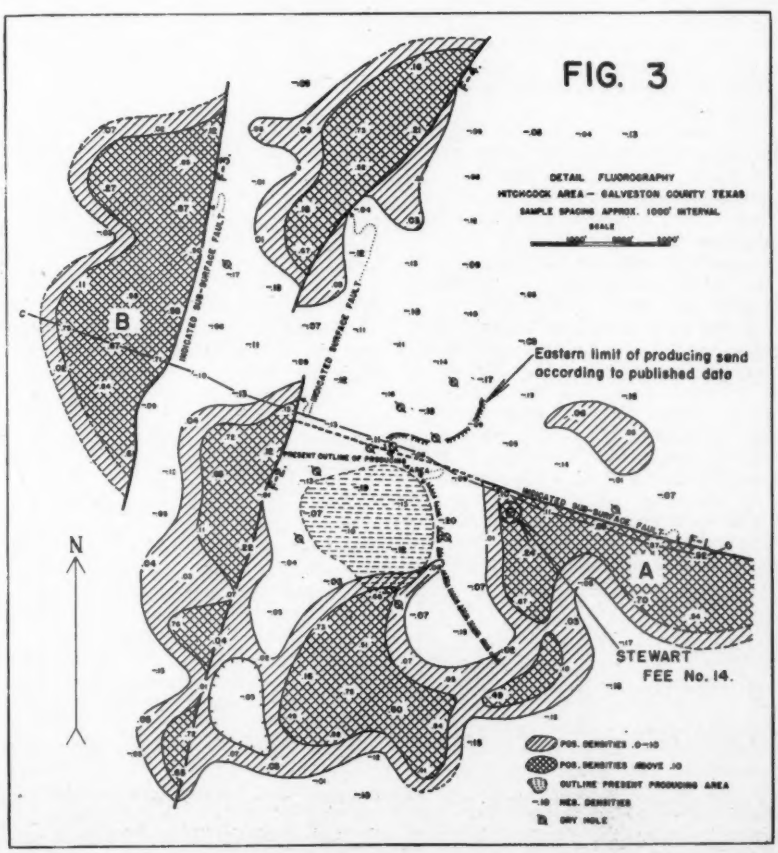
Previously published geological data classifies this field as a stratigraphic type of accumulation. The sand producing oil in the old part of the field was depicted as pinching out on the east side of the productive area. This was based on the fact that certain wells on the east and northeast sides of the producing area failed to encounter this sand. These wells are numbered 1, 2, 3 and 4 and a study of them shows evidence that the producing sand apparently did pinch out.

Figures showing the areal distribution of the surface hydrocarbon concentration as determined by fluorography indicate that the failure of the above-mentioned wells to find the sand was due to faulting. They also indicate the presence of the sand eastward, and a probable productive area larger than the old portion of the field. Possible extension is shown as A.

Based upon fluorographic interpretations of the region, 14 Stewart fee was drilled. This well produced 21 bbl. of pipe-line oil per hour through a ¼-in. choke, with 600 lb. tubing pressure. It has been completed for over 5 months, and has not shown any water. There has been no appreciable drop in pressure.

Another possible new area of production is shown on the map as B. This has not been tested; however, well No. 5 near this area did not find any of the Hitchcock sand. The electrical log of this well indicated approximately 175 ft. of section missing where the producing sand should have been encountered.

Fluorography does not claim to supersede any other method of exploration, but in the hands of a competent geologist, it is expected to prove of considerable value as a tool to assist in the collection of geological data not otherwise available except at considerably greater cost. The apparent ability of this method directly to detect the presence or absence of an oil deposit should, when coordinated with all other available data, appreciably reduce the number of wildcat failures.



PROGRESS IN METALS

by W. L. Nelson

Degreasing Agents For Metals

THE principal methods of industrial metal cleaning are: (1) The use of alkaline compounds which exert a saponifying or emulsifying action on the grease or oil; (2) cleaning with chlorinated hydrocarbon solvents; (3) cleaning with petroleum solvents such as gasoline or naphtha.

Alkaline cleaners contain one or more compounds such as sodium carbonate, caustic soda, trisodium phosphate or sodium silicate. Alkaline cleaning is effective for many metal parts. Some of the shortcomings of the alkaline cleaning are said to be the danger of etching precision parts, the danger of staining insufficiently rinsed parts, slowness, and failure to clean inaccessible recesses.

Metal cleaning with chlorinated solvents is one of the most recent cleaning developments. This is perhaps the best cleaning method. The most important solvents used are trichlorethylene, carbon tetrachloride, and perchlorethylene.

The solvent is applied by dipping, spraying or condensation of vapor on the parts, or combinations of these. It is necessary to add a corrosion inhibitor and a stabilizer to trichlorethylene. The stabilizer prevents decomposition induced by certain metals, notably aluminum, magnesium, or zinc, or their alloys.

In the case of carbon tetrachloride, corrosion may be reduced to a minimum by constructing the equipment of selected metals in the following order: nickel Monel, 18-8 stainless steel containing 2 to 4 per cent molybdenum, lead, tin, well-tinned copper, galvanized iron, and copper.

In cleaning with petroleum solvents, each part is dipped in successive baths. The solvent soon becomes contaminated and the method is relatively slow and inefficient.

Some Comparisons

There is no fire hazard with alkaline cleaners. The chlorinated solvents are noninflammable, although trichlorethylene-air mixtures are flammable under certain conditions. Petroleum solvents are highly flammable and explosive. Carbon tetrachloride is often added to petroleum solvents to raise the flash point and reduce the fire hazard, but the flash-point range of the solvent itself and the loss of carbon tetrachloride by evaporation during use make this an unsafe practice unless carefully controlled.

No cleaners are entirely without health hazards. Alkali cleaners will cause serious burns. Operators should be equipped with goggles, rubber gloves, boots and aprons. Chlorinated solvent vapors are toxic. Since the vapors are heavy, rooms should be ventilated with exhaust ducts placed at the floor level. Petroleum solvents are less toxic than chlorinated solvents. The order of toxicity is: naphtha, gasoline, Stoddard's Solvent, and F-140.

Relative costs of the different methods which would apply to any user cannot be stated. The cost of supplies is least for alkaline cleaners. In the case of chlorinated solvents, the liquid is used over and over, so that a higher original materials cost may not represent a higher operating cost.

Abstract: Metal Degreasing Agents, by H. P. Quadland, Metal Finishing, Vol. 41, 1943, p. 463. Taken from Metals & Alloys, October 1943.

Reclaiming Tungsten Carbide

THE Aircraft Engine Division of the Ford Motor Co., reclaims tungsten carbide tool tips that have served their purpose.

The tip is kept for an hour in a concentrated bath of nitric acid at a temperature of 150° F. After it is washed in water, it is possible to remove it from the shank with a slight tap. Contaminating iron and brazing material are removed in a bath composed of equal parts of nitric acid, hydrochloric acid and water. Next the chips are washed in a caustic bath. Titanium and tantalum chips are removed in a hydrogen-atmosphere furnace at 240° C. They can be easily separated because they turn brown while the tungsten chips remain gray.

After this, the carbide chips are pulverized in a 100-lb. Bradley power hammer and drawn off by the air current of a centrifugal exhauster, through a cloth filter. The dust settles in a trap from which it is recovered.

Oxides are reduced by placing the pulverized tungsten carbide in carbon boats in a hydrogen-atmosphere furnace at about 1,500° F. for 20 minutes. The powder is then put through a 400-mesh sieve and is ready for use. What does not pass through is repulverized. A binder of a 3½ per cent solution of paraffin wax in trichlorethylene is added and the mixture is dried for 2 hours in an oven at 140° F.

To form into shapes, the mixture is compressed in steel molds under a pressure of from 5 to 12 lb. per sq. in. The lower pressure range is generally used as the higher, although giving higher density, causes lamination.

Next the tungsten carbide is covered with aluminum oxide. After preheating to drive off the wax, it is "soft-sintered" at 1,600° F. for 20 minutes. It is then chalklike and can be cut with a saw, file or grinding wheel. It is cut to 17 per cent oversize in all directions to allow for shrinkage in the final sintering. This is done in carbide boats in which the shapes are covered with flake graphite and passed through a hydrogen-atmosphere furnace, at 2,760° F. for 20 minutes at heat. The shapes are then ready for brazing to tool shanks, die holders, etc.

Abstrated from Automotive & Aviation Industries, p. 42, May 1, 1943. Taken from Metals & Alloys, August 1943.

Metallurgical Terms

Rimmed Steel

By control of analysis, temperature, etc., it is possible to produce a steel which when poured into molds will partly deoxidize itself on the surface which is in contact with the mold. This type of deoxidization or killing leaves a surface of almost pure iron and drives the other constituents and impurities towards the center of the ingot. When such an ingot is sectioned and etched the skin or rim shows up plainly and thus the name "rimmed steel" was suggested. Rimmed steel is usually under 0.25 carbon and low in silicon and manganese, and is largely used for the production of soft wire, sheets, etc. (Joseph T. Ryerson & Sons, Inc.—General Data Book.)

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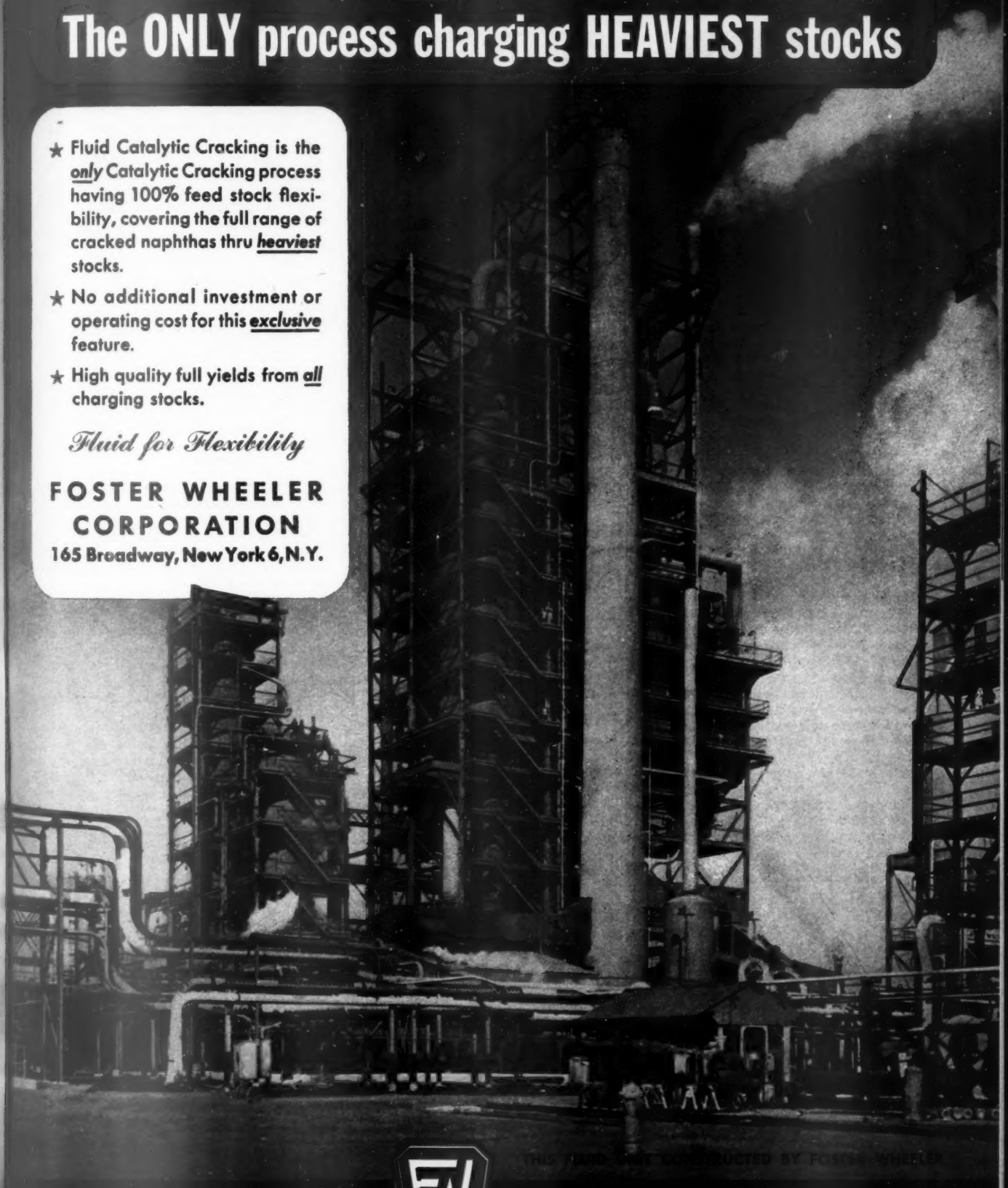

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Oil-Well Pumping Practices—No. 22

Prime-Mover Requirements For Pumping Installations

by J. Zaba

Pumping efficiency is dependent to a large extent upon the adaptability in size and type of the prime mover. Factors to be considered in choice of prime movers are discussed in this installment.

IF a well-load formula is used for the purpose of estimating the loads which will determine the size of the reducer to be used, it is convenient to arrive at the direct relation between peak torque and production. This relation will depend, of course, on which of the well-load formulas is used and what counterbalance is assumed. Once these two assumptions are made, the peak torque equals well load less counterbalance times half of the stroke. At the same time, the product of the length of stroke and of number of strokes per minute is expressed as function of production for a given plunger. The result is relation between torque and production. Such relation for the Slonneger's well-load formula has already been shown in Installment 14.

It is possible also to go a step further in this direction and starting with a well-load formula construct curves giving torque capacity requirements for different combinations of lift and production.[1] Assumptions, however, which have to be made in order to make possible construction of the curves, limit the practical value of their application. Certain lengths of stroke for given torque capacity and also certain rod and plunger sizes have to be assumed. Also the curves are applicable only for counterbalance which was used in arriving at value of peak torque from the load formula.

Selection of Prime Movers

Gas engines.—Two factors which have to be considered in selecting gas engines are engine speed and engine horsepower.[2,3] The piston speed of the engine is expressed in feet per minute and can be secured from revolutions per minute by use of the formula:

$$V = \frac{2 \times L \times RPM}{12}$$

where

V = piston speed in feet per minute
L = piston stroke in inches
RPM = revolutions per minute

The horsepower output of the engine varies in nearly direct proportion with the speed of the engine. General practice of the manufacturers is to rate the engines at the piston speed of 1,000 ft. per minute. At a constant speed there is a directly proportional relationship among the horsepower output of the engine, the mean effective pressure (the average pressure on the piston during the working stroke) and the heat to be dissipated by the engine. For continuous service, for four-cycle gas engines piston speed of 1,000 ft. per minute and around 70 lb. per sq. in. brake mean effective pressure appears to be accepted as satisfactory. For two-cycle engines piston speed of 800 ft. per minute and 45 lb. per sq. in. brake mean effective pressure is generally recommended.

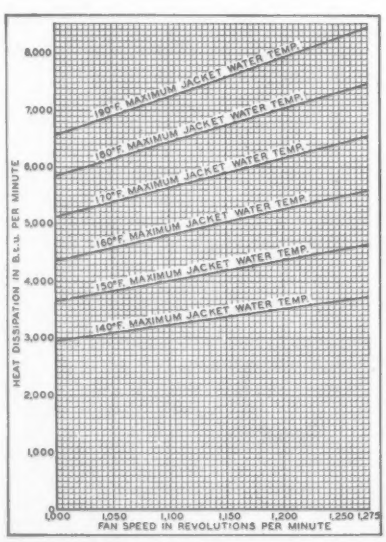


Fig. 1: Relation between fan speed and cooling for a vertical radiator-type engine-cooling unit. (Values apply to only one type and size of unit)

Only about 25 per cent of heat supplied to the engine by the fuel is converted into useful work. About 30 per cent is dissipated by the jacket water and around 35 per cent by the exhaust. In view of relation between the horsepower output and heat to be dissipated by the engine, the question of proper cooling is important in selection of the engines.

In case of large installations with circulating water system the amount of water needed for cooling of engine can be calculated from the formula:

$$W = \frac{CP}{8.33\ (T_1 - T_2)}$$

where

W = amount of cooling water needed, gallons, per minute
P = loading of engine in brake horsepower
$T_1 - T_2$ = temperature difference between incoming and outgoing cooling water, 20° F. being usually assumed as satisfactory

Factor C represents number of B.t.u. to be dissipated by the engine per minute per brake horsepower. This factor, for the gas engines, is said to vary between 72 and 85. The factor of 8.33 converts, in the formula, pounds to gallons.

Calculating Water Volume

The quantity of water calculated by this formula represents only amount of water needed for cooling of engine. In case it is desired to cool also the exhaust manifold the same formula with corresponding value of factor C, can be used for the amount of water used. The sum of the two quantities thus calculated represents the total water requirement. This quantity is increased usually by an additional small amount to provide the factor of safety.

For small engines with radiator-type cooling system, the important factor is not the quantity of water but the rate of circulation both of water and of air. Manufacturers furnish performance-curves charts for the cooling systems, which make possible selection of proper size of the system. Fig. 1 shows a typical cooling unit performance chart. The heat dissipation is given for the surrounding air temperature of 100° F. If the surrounding temperature differs from the standard, temperature correction has to be made. For instance the 170° F. maximum jacket-water temperature represents excess of 70° F. over the standard temperature of surrounding air of 100° F. If the surrounding air temperature is 90° F instead of 100° F. the curve for 160°

F., as representing 70° F. excess over surrounding air, has to be used.

For any given fan speed and for any desired maximum jacket-water temperature the heat dissipation in B.t.u. can be read directly from the chart. This figure, divided by the factor C of the previously given formula, gives the horsepower size of the engine the unit will cool satisfactorily. Conversely, with given size of engine, the horsepower rating of the engine, multiplied by factor C, gives number of B.t.u. to be dissipated per minute. From this figure the speed of fan necessary to provide the desired maximum jacket-water temperature for the engine can be read directly from the chart.

In selecting a gas engine, an economic balance must be arrived at in regard to three factors—fuel economy, initial investment and possible overload of the engine. Fuel consumption of a gas engine increases with the increase in underload of the engine. In Installment 18 a general table has been presented showing relation of fuel consumption to the per cent of maximum loading of the gas engine. In Fig. 2 this relation is shown

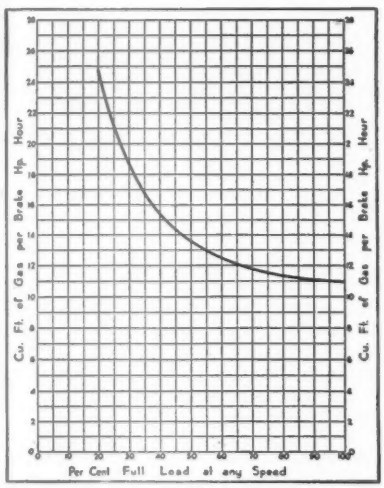


Fig. 2: Representative fuel consumption in relation to load for multicylinder gas engines fully equipped with accessories and using 1,100 B.t.u. gas (after James McNiell, The Oil and Gas Journal, Nov. 18, 1938)

for multicylinder gas engine fully equipped with accessories.

Increase in fuel consumption at light loads and higher investment in larger engines present in argument in favor of using engines loaded closely to their rating. On the other hand cost of keeping in good repair a severely loaded engine may be prohibitive and becomes usually the factor governing the selection. A decision on the selection of the size of the engine should be based on consideration of these three factors.

A.P.I. Specifications. — The standards and methods of rating of the gas engines, as prescribed by A.P.I.[4] specifications, refer both to bare engines and to internal - combustion power units. The term bare engine is defined as follows: "A bare engine is an engine complete with all accessories less clutch, fan, water pump, air cleaner and muffler". The definition of power unit is as follows: "A power unit is an engine complete with all accessories, except muffler, supplied or recommended as standard equipment by the manufacturer". For the bare engine the manufacturer is to supply curves (on A.P.I. standard rating test forms) showing maximum brake horsepower vs. revolutions per minute, A.P.I. bare-engine horsepower vs. revolutions per minute and three curves for bare-engine fuel-consumption rates vs. observed horsepower. The three curves are the minimum, intermediate and maximum speed fuel-consumption curves. The maximum speed is the speed recommended by manufacturer as maximum for continuous oil-field service. As far as the internal - combusion power unit is concerned the A.P.I. standard rating form requires following performance data: (1) maximum brake horsepower vs. revolutions per minute both for bare engine and for power unit, (2) A.P.I. power-unit horsepower vs. revolutions per minute, (3) power - unit maximum torque vs. revolutions per minute, (4) three power-unit fuel-consumption rates vs. observed horsepower. These rates are to be shown for three speeds as in case of bare engine. The A.P.I. Standard Rating Test Form lists, in addition to the curves described above, a number of other engine and engine accessories characteristics, information on which is also to be furnished. Data on conditions of test are also included.

The maximum brake horsepower as used in the A.P.I. specifications is defined as the greatest horsepower, corrected to standard conditions, which can be maintained continuously at any given speed under test conditions. A.P.I. power-unit horsepower is defined as 65 per cent of the power-unit maximum horsepower within the range shown. Corresponding definition applies to the A.P.I. bare-engine horsepower. The specifications define standard conditions of test and furnish formulas for correcting the observed horsepower to standard conditions of test. Because of establishing of these standard conditions of test and because of uniformity of data required, the A.P.I. standard rating form gives the purchaser an opportunity to compare the performance characteristics of different makes of engines.

Tentative specifications for testing and rating of radiator-type cooling units have been published as a supplement to A.P.I. Standards for Internal Combustion Engines.[5] The specifications, which are not final, prescribe the data and information to be shown on the name plate of the unit, define standard conditions of tests and give formulas for converting observed results to standard conditions of test.

Electric Motors.—The type of loading encountered in oil-well pumping necessitates use of "application factor" in selecting of the electric motor for powering of a pumping installation. The governing factor of rating of a motor is its temperature rise due to operation. This heat depends primarily on power peaks and minima, not on the average current. Rating of a motor operating under constant loading cannot be therefore applied to oil-well pumping conditions.[6]

The following formula has been presented for horsepower rating of a general purpose pumping motor[7]:

$$\text{Horsepower rating} = \frac{K \times B \times L \times 1.5}{T}$$

where

K = kilowatt hours per barrel fluid per 1,000 ft. of lift
B = barrels fluid per day
L = lift in thousands of feet
T = pumping time in hours per day

Factor of 1.5 includes the application factor and motor efficiency and converts kilowatts to horsepower. Factor K has been found, from a large number of tests, to average close to 0.4 kw-hr. per bbl. of fluid per 1,000 ft of lift.

Importance of selection of a proper size of motor for given pumping conditions has been already emphasized in Installment 18 of this series. The efficiency of an electric motor decreases very rapidly if the motor is loaded considerably below its rated capacity.

The last "Official List Publications of the A.P.I. Division of Production" published in October 1943, states that the A.P.I. Std. 11-F: "Electric Induction Motor Performance Data" adopted in December 1928 has been discontinued as obsoete.

Other Types of Surface Pumping Equipment

The above consideration of rating and selection of surface pumping equipment concludes the discussion of a unit sucker-rod pumping installation. From the standpoint of surface pumping equipment only standard, selfcontained pumping unit was discussed because it represents, by far, the majority of installations now in operation. Many of the considerations presented in the last few installments can be applied to other types of surface pumping equipment such as standard pumping rigs or spe-

cial type, long-stroke pumping units. A radical departure from the walking-beam pumping assembly are the hydraulic - pneumatic pumping units. In this type of installation the plunger of the pump is still activated from the surface by a string of sucker rods but the pumping motion is imparted directly to the string by a hydraulic unit. The whole conventional surface pumping assembly is thus eliminated. In certain types an air chamber is used for cushioning of the downstroke. Dynamometer cards taken on such installations indicate a very satisfactory performance of the subsurface pumping equipment.

Before considering the next subject of this series, the multiple sucker-rod pumping system, it is necessary to revert once more to the unit pumping installation. It has been emphasized previously in the series, that a sucker-rod pumping installation is a unit and has to be considered as such. It has been pointed out that there is a close interrelation of action of all the elements from the primemover to the pump plunger. In following a number of installments, which were needed to cover the subject, this idea of interrelation of performance of different elements of a pumping installation may have been easily lost. In order to bring out again this point an actual example of calculating a pumping installation will be worked out. Such an example will serve also as an illustration of practical application of methods and formulas presented.

Biblicgraphy

1. Emory N. Kemler: "Economic Selection of Oil-Field Equipment." Oil Weekly—June 30, 1941, p. 28.
2. T. P. Sanders: "Proper Selection of Primemover leads to Pumping Economy." The Oil and Gas Journal—June 27, 1940.
3. Producing Equipment Directory—1940-41, p. G-13.
4. A.P.I. Specification for Internal Combustion Engines for Oil Field Service—A.P.I Std. No. 11-C, Fifth Edition, May 1942.
5. Supplement No. 1 to the Fifth Edition of A.P.I. Std. 11-C "Internal Combustion Engines"—April 1943.
6. W. C. Lane: "The High-Slip Cage Type Motor for Pumping"—Oil Weekly, Aug. 8, 1938, p. 30.
7. Producing Equipment Directory—1940-41, p. F-26.

Mechanical Causes of Casing Failure

(Continued from page 48)

6. Use oversize rubber protectors on drill pipe running in surface casing, at least one protector to each joint of drill pipe. The kelly, or top drill pipe joints, should especially use long, oversize protectors, since this point of the drilling string is likely to cause more continuous wear and heavy vibration and is the most inflexible portion of drilling hook-up.

7. Be sure surface casing is solidly cemented around the top and braced against vibration before drilling.

8. On water locations, 10¾-in casing otherwise unsupported should not project for more than about 12 ft. above the point where it is solidly cemented into the ground. If this distance is greater, the 10¾-in. should be firmly encased within larger casing to give it proper column support.

B.—Intermediate and Oil Strings—Precautions

1. Exercise extreme care while running casing to stop string immediately if obstructions are encountered. Remember that 6 in. lowered at the surface can place as much as 3,500 ft. at the bottom of the string in compression. Eliminate the obstruction according to experience in the area concerned, by circulating or by carefully working the pipe up and down and, if the friction developed is considered too heavy, pull out the string and clear the obstacle by reaming or other means. Never attempt to force pipe through obstructions because of the danger of either sticking or damaging the casing.

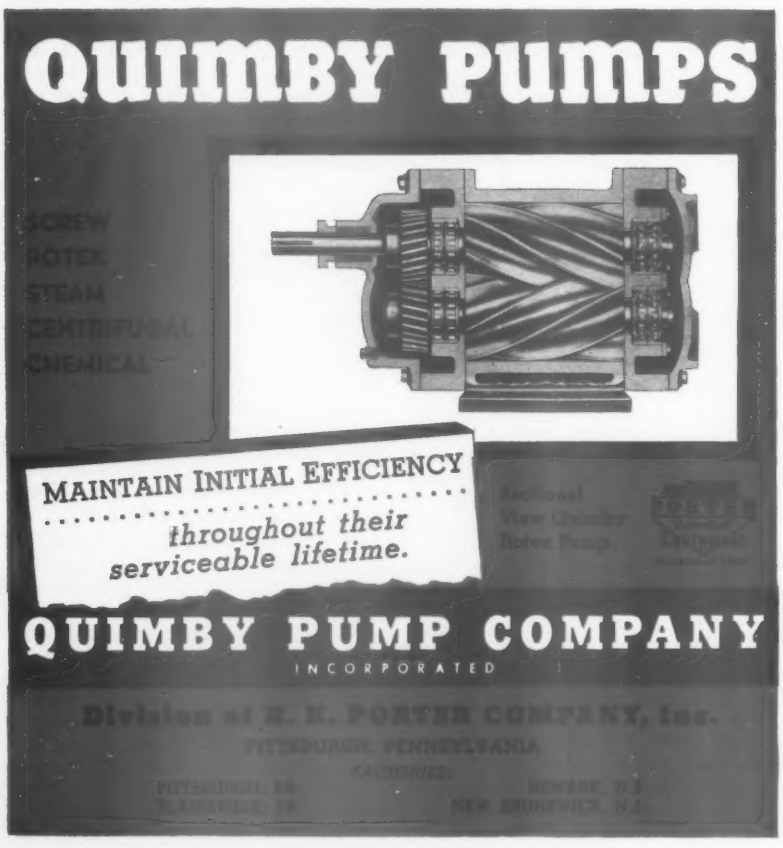
2. After cement is set, never let off casing weight at the surface more than is required to determine freeze point as set forth by the method described in this article. Use 4 in. per 1,000-ft. compensation strain in upper portion of casing instead of present 2½ in. per 1,000 ft. in oil wells deeper than 1,000 ft. or in which over 250° F. bottom-hole temperature is expected.

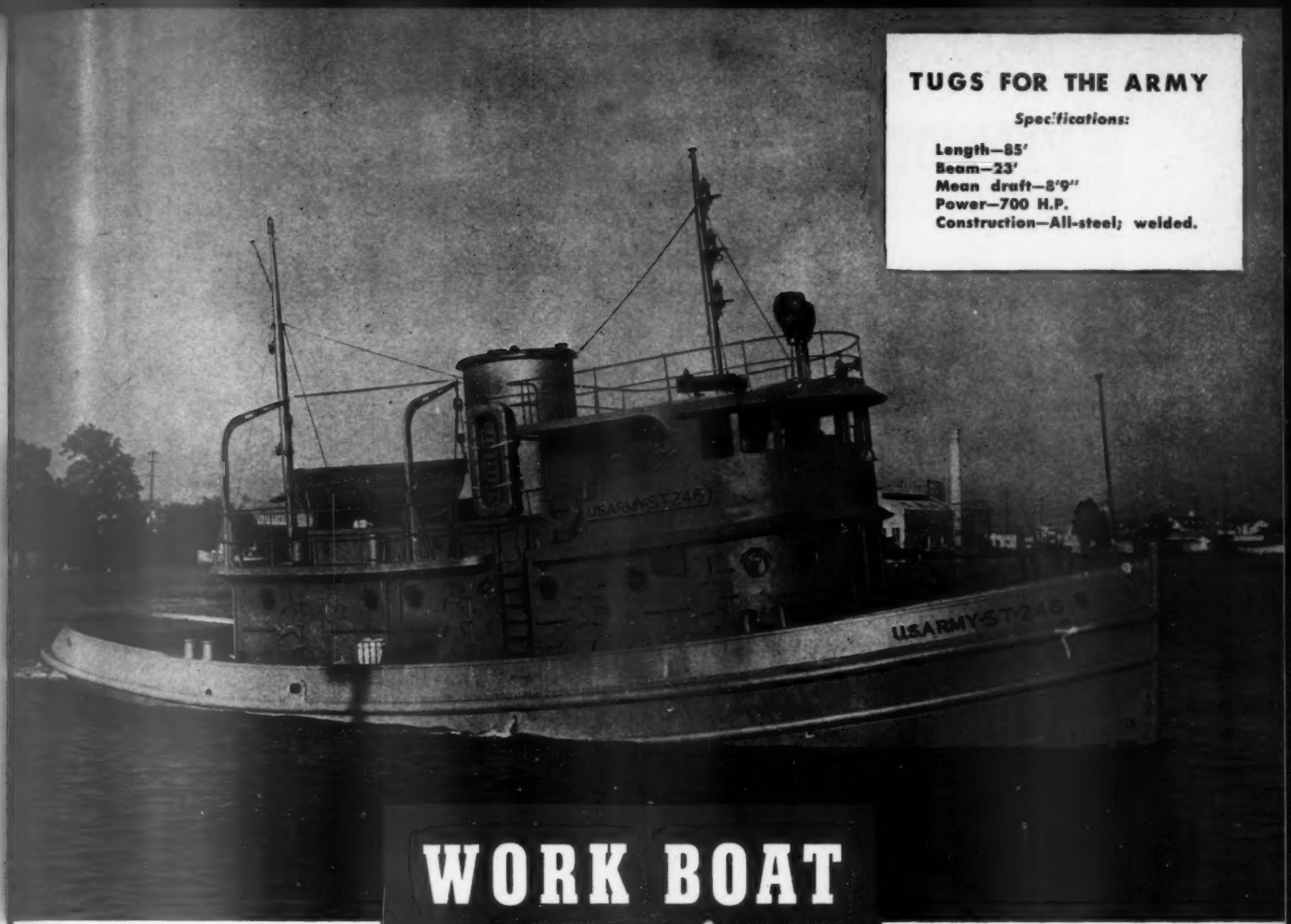
3. When lowering casing weight onto casing head, observe for any sinking of casing head; if more than an inch or two occurs, consider additional support for surface casing string. This may involve recementing, filling in, supporting on to piling or other assistance.

4. If dog legs or crooked places are known to exist in a well, use casing protectors at these points on drill pipe during "drilling in" operations inside casing. This is especially necessary if the crooked place is a substantial distance above the casing shoe, because the weight of drill pipe below the kink accentuates the wear, by increasing the horizontal force component at the crooked point.

5. Use casing protectors on each drill pipe joint in all cases where extended drilling operations are to take place inside casing; i.e., inside intermediate strings.

6. Where drilling operations have been conducted inside an intermediate string for any considerable time, it should be considered hazardous to use this string as an oil string under high pressure loading. It should be packed off from exposure to full well pressures.





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Mean draft—8'9"
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Pressure Maintenance in Wertz Field Provides Sustained Production

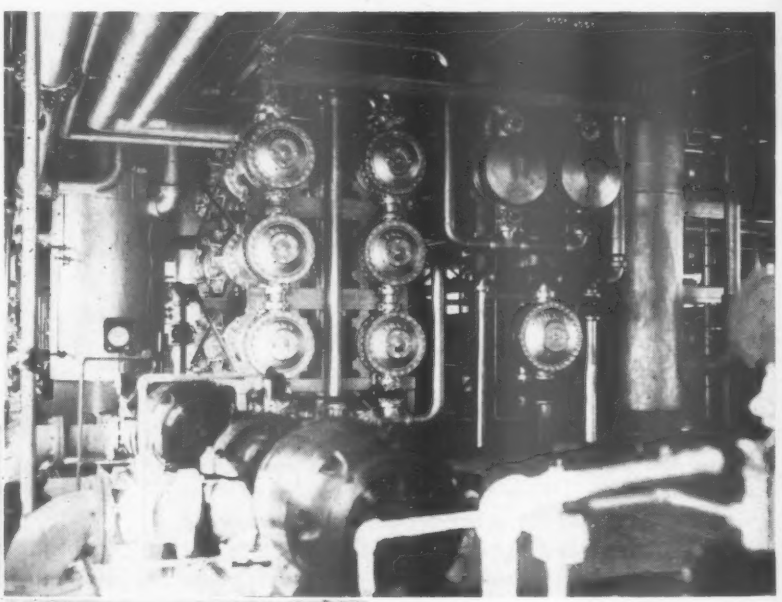
by Neil Williams

In the unique pressure-maintenance project described in this article, a volumetric balance between oil withdrawals and gas injected is being maintained in the producing reservoir which will make possible maximum ultimate recovery and depletion of the reservoir in a much shorter time than otherwise would be required. Other features are embraced in the operations.

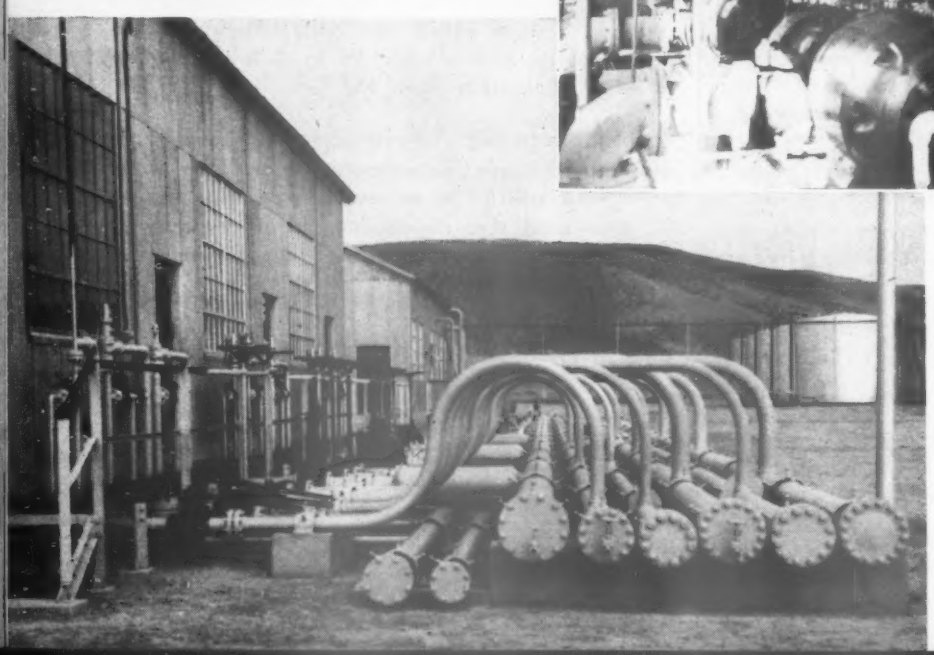
IN a pressure-maintenance program the usual primary objective is to prevent or retard, by return of produced gases to the formation, decline of reservoir pressures to the end that greater ultimate and more efficient recovery of the oil might be attained. As applied to reservoirs under hydrostatic drive, this embraces control of water movement into the reservoir to prevent channeling and coning of the water and trapping of oil, and to utilize this natural energy to its fullest extent in forcing the oil to the well bores uniformly. Ordinarily, this necessitates restriction of fluid-withdrawal rates to those of water ingress, which in turn may prolong many years the time required to recover the oil. In this, there may be periods, as in the present war emergency, when permissible withdrawal rates are not adequate to meet urgent current needs and demand for oil.

Pressure-maintenance operations being carried out by Sinclair-Wyoming Oil Co. in its Wertz dome field, located in Carbon and Sweetwater counties, Wyoming, have been designed to take care of the latter contingency within reasonable limits. As far as is known this project is unique. While providing for the preservation of reservoir pressure, and control and utilization of the hydrostatic drive, the operation also effects sustained daily production at higher rates, variable within limits according to needs. As proof, reservoir pressure now actually is being increased although oil withdrawals for some time have been sustained at a rate substantially above that at which it is calculated the water is advancing. A volumetric balance has been maintained between oil withdrawn and gas injected, and by this it will be possible to realize maximum ultimate oil recovery and depletion of the res-

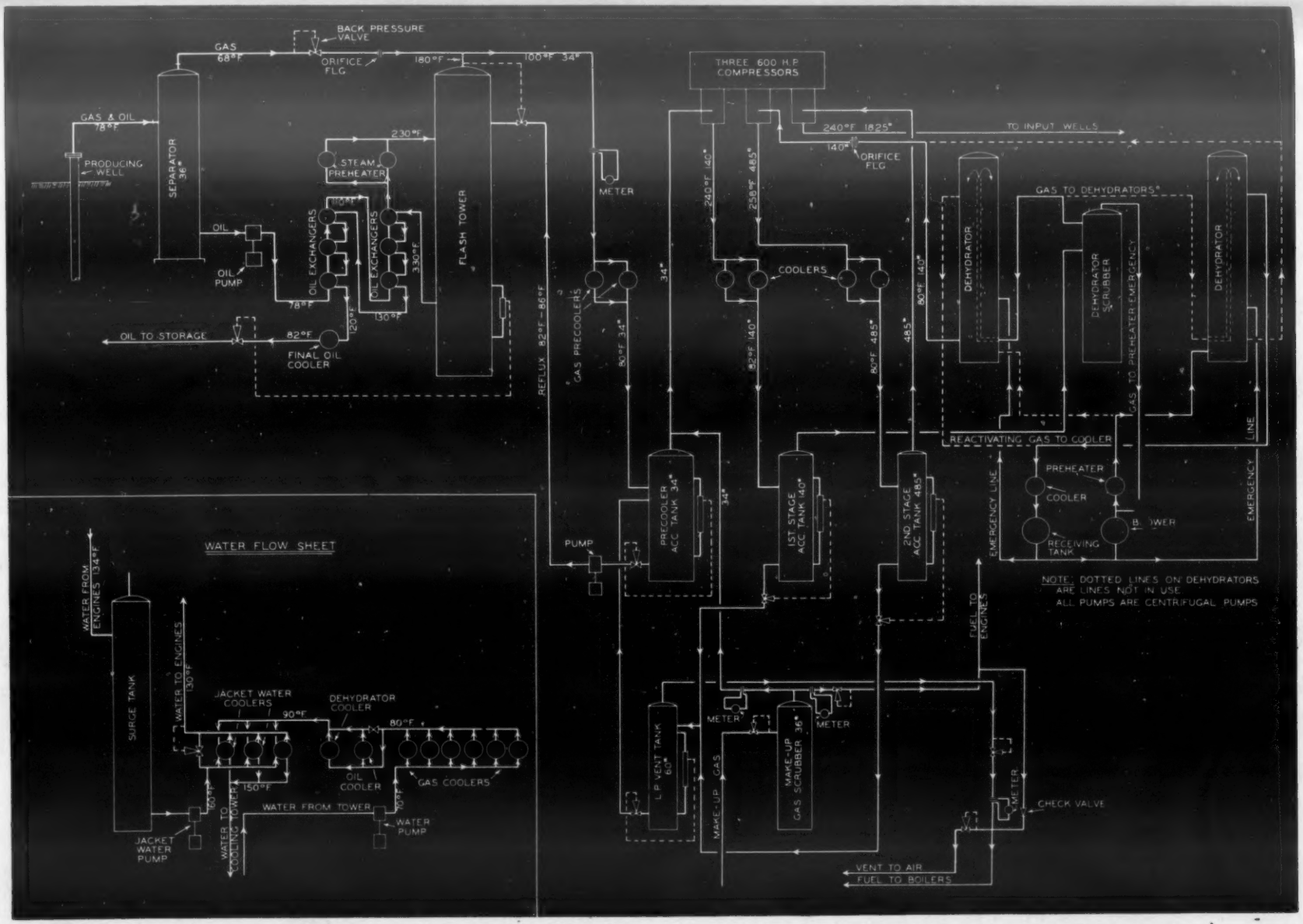
(Continued on page 65)



Right: Crude-stabilization unit including flash tower (column partly visible at left), two banks of oil-to-oil heat exchanger (center) and steam preheater (horizontal vessels at left). At extreme right is one of the dehydration columns. In foreground are two of the three motor-driven centrifugal water circulating pumps

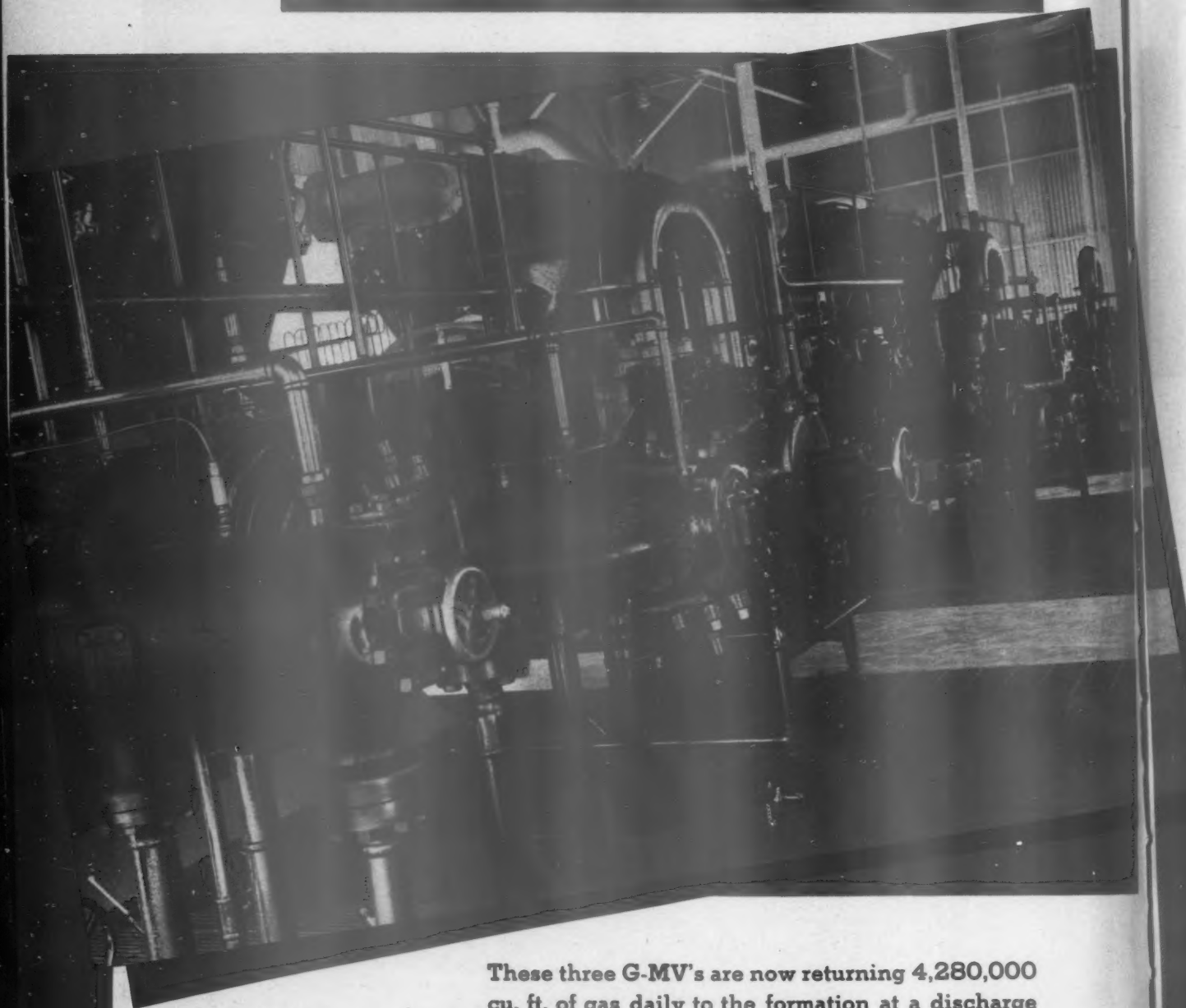


Left: Compressor intake and discharge header system. High-pressure discharge header to field gas return line at extreme right. Compressor plant at left with processing plant building at left rear



Flow diagram Sinclair-Wyoming Oil Co.'s pressure-maintenance plant in the Wertz dome field, Carbon and Sweetwater counties, Wyoming

...PRESSURE



These three G-MV's are now returning 4,280,000 cu. ft. of gas daily to the formation at a discharge pressure of 1825 p. s. i. Each unit has a rated capacity of 2,000,000 cu. ft. a day at 50-lb. suction and 2,500-lb. discharge pressure. Photo above shows close-up of low pressure cylinder; at left, high pressure.

TYPE G·MV ANGLE

Compressors

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MAINTENANCE at the WERTZ DOME

THREE Cooper-Bessemer G-MV compressors are used in pressure maintenance operations at the Wertz dome field of Sinclair Wyoming Oil Company, and after two and a half years of operation are credited with 1,623,237 barrels of oil which could not otherwise have been produced in that period.

Previously it was estimated that fluid withdrawal could not exceed 3300 barrels daily without depletion of reservoir pressure. Under the gas injection program sustained withdrawal has been 5750 barrels daily, and in addition, the reservoir pressure has been increased sixteen p. s. i.

While originally much concern was felt about corrosion from H_2S, the system was installed with special precautions to prevent the formation of sulphuric acid, and to date the plant has shown no sign of corrosion.

The compressors are 600 horsepower, two cycle, V-angle, gas engine compressors. Sinclair is finding them ideal, for this pressure maintenance program. Cooper-Bessemer G-MV's are built to give economical, long-lived service wherever compressors are needed in the oil and gas industries.

G-MV's are on the job—

Continuous gas injection for 2½ years without a sign of H_2S corrosion.

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Case History Demonstrates the Efficiency and Economy of

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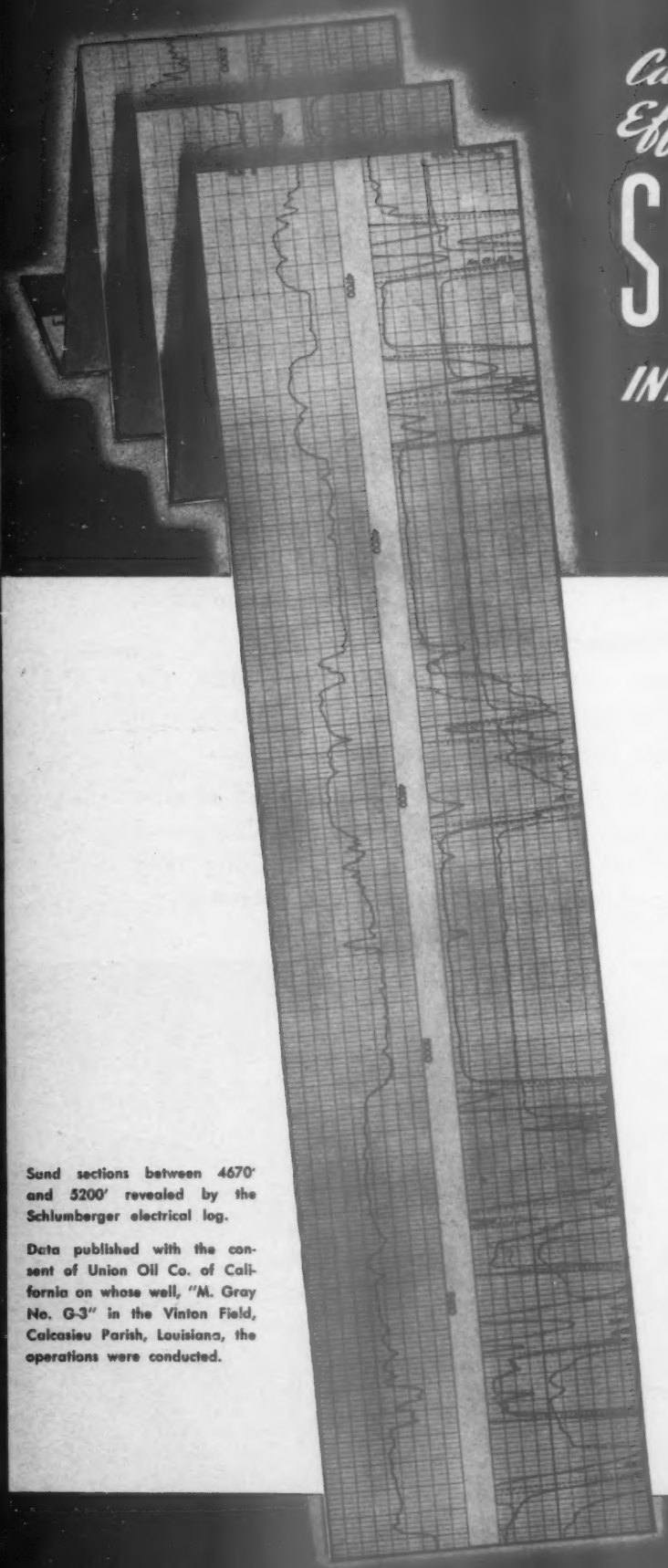
INTEGRATED WELL SERVICES



Sand sections between 4670' and 5200' revealed by the Schlumberger electrical log.

Data published with the consent of Union Oil Co. of California on whose well, "M. Gray No. G-3" in the Vinton Field, Calcasieu Parish, Louisiana, the operations were conducted.

Here is an example of how oil operators may obtain

MAXIMUM SUBSURFACE DATA AT MINIMUM COST AND LOSS OF RIG TIME

1. MAXIMUM SUBSURFACE DATA—The following Schlumberger services were used on this well:

   A. **Electrical Logging**—Three surveys at 656'-4436', 4436'-4790', and 4790'-5359', respectively. Although no conventional cores were taken, these surveys provided:
      1. Correlation
      2. Discovery of oil sands
      3. Water levels

   B. **Side Wall Coring**—Fifty-one side wall cores were taken in three operations subsequent to the three electrical logging surveys. These cores:
      1. Confirmed the existence of oil sands and their nature
      2. Indicated the extent of saturation
      3. Determined gas-oil contact

   C. **Photoclinometer**—Since this well was on the flank of the dome and the sands dipped steeply, it was important to know the exact location of the bottom of the hole. A Photoclinometer survey was made in connection with the second logging and sampling operation.

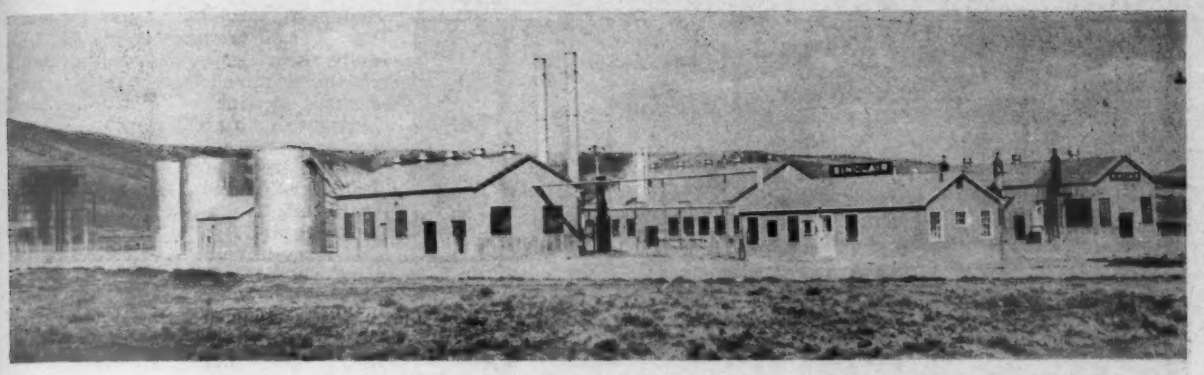
   D. **Dipmeter**—In order to ascertain the true thickness of the sand to aid in making subsequent locations, a Dipmeter survey was made after the third electrical logging survey to determine the magnitude and direction of dip.

   E. **Precision Gun Perforating**—For precise shooting, the same truck and cable used for the above operations were also used for the gun perforating.

2. MINIMUM COST AND LOSS OF RIG TIME—This wealth of information was obtained at a total cost of approximately $2,200.00. Because of the integrated nature of the various services, only four trips to the well location with a single service unit were required. Due also to this unique feature of Schlumberger service, total rig time required for all operations was only 21 hours.

SCHLUMBERGER WELL SURVEYING CORPORATION

HOUSTON, TEXAS



Left to right, are: Induced draft water-cooling tower; water-treating plant; power plant (electricity and steam); gas and oil processing plant (building at rear); office, laboratory and shop building (foreground), and compressor plant (rear)

(Continued from page 61)

ervoir in a much shorter time than otherwise would be required.

Wertz dome is a sharply-folded anticlinal structure, very typical of the many large, surface-evident structures existing in Wyoming. It has been productive of gas from various shallow horizons, principally the Frontier, Cloverly and Sundance formations, since 1920. The pressure-maintenance operations, however, apply only to the deeper Tensleep formation of Pennsylvanian age, in which oil production was discovered late in 1936.

The Tensleep formation is a sandstone streaked with dolomite and lime. At Wertz it has an average productive section of from 300 to 350 ft., and is found at depths ranging from 5,800 ft. on top the structure to 6,500 ft. down the flanks. Its proved productive area covers 1,200 to 1,300 acres. So far the productive limits have not been determined except at one point, where a recently completed well is making some water. The only other well to make any water is at a location structurally much higher than many of the other wells. Average porosity is about 14 per cent while permeability varies greatly, ranging up to 250 millidarcies. It is characteristic that the formation apparently has very little vertical permeability, a point which has a specific bearing on some of the gas injection and production practices to be discussed later. To date, 21 producing wells and 2 gas input wells have been completed.

Analysis of Crude

Crude oil from the wells has a gravity of 35.0° Be. Through stabilization the gravity is raised approximately 1° for pipe-line delivery. A distillation analysis of the Wertz crude from well samples before stabilization follows:

Color: Dark brown to black; gravity: 35.0° Be. Reid vapor pressure: 4.4 lb. sq. in.; sulfur: 1.30 per cent; salt: none; Mg. salt: none; b.s. & w.: none.

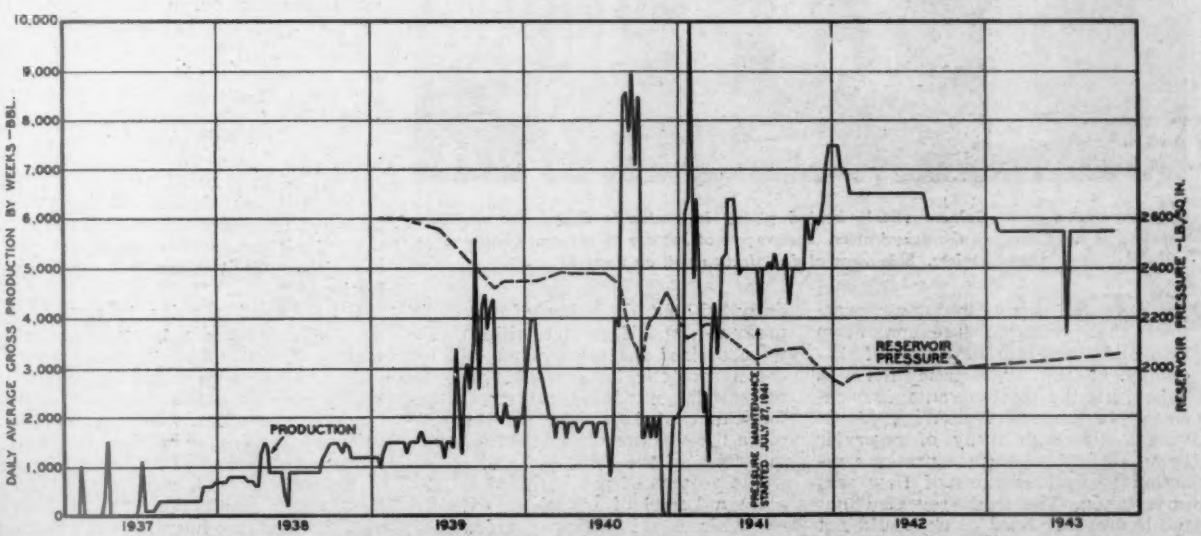
Distillation:

Temp. °F.	Per cent dist.	Gravity°	Sulfur per cent
To 330	19.5	66.8	.030
330-400	12.1	49.6	.144
400-520	13.9	40.8	.230
520-Off	14.6	33.0	1.035

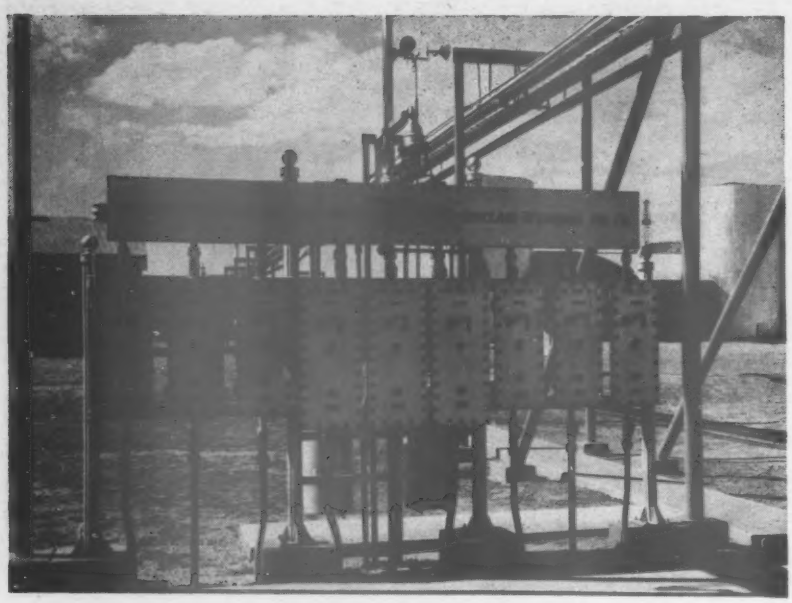
Straight-run and bottoms yield approximately 56 per cent gasoline.

The oil in the reservoir and as produced is under-saturated. Originally, and at least up to the time injection of gas to the formation was started there was no free gas in the reservoir and at that time the average gas-oil ratio in production was only 200 cu. ft. per bbl. Since gas has been returned to the formation the average gas-oil ratio has increased to about 400 cu. ft per bbl. By progressive control in high-structure wells as their respective ratios increase and by otherwise controlling the gas input and production it is planned to attempt to hold the average ratio within reasonable limits. This will eliminate the necessity for handling excessive volumes of recycled gas.

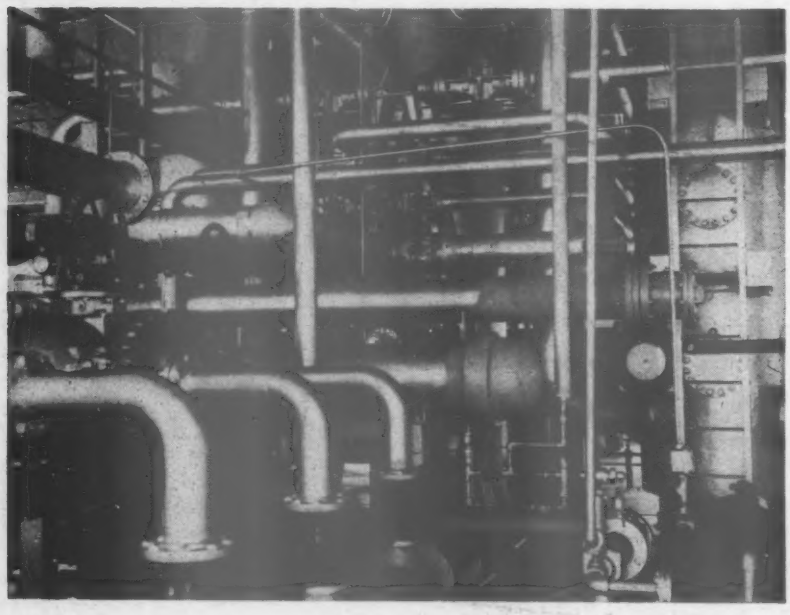
Early in the development it was



Daily average production (by weeks) and reservoir pressure curves. *Discussion on page 66*



Central control installation for all electrically operated units. It is located at a convenient place close to both the processing and compressor plants



Gas-dehydration unit. Column visible behind piping in center is dehydrator scrubber. Columns on each side are the dehydrators. Exchangers at left are compressor engine-jacket water coolers. Side view of dehydration unit on page 67

proposed to initiate production practices that would insure maximum utilization and conservation of the energy of the hydrostatic drive in expediting the most advantageous recovery of the reserves. With this in view a thorough study of reservoir behavior and subsurface pressure reaction to various rates of flow was undertaken. The study revealed that the hydrostatic head alone would not permit a fluid withdrawal rate of more than approximately 3,300 bbl. daily without depletion of reservoir pressures, and if greater withdrawals were desired the energy supplied by the hydrostatic head would have to be supplemented by return to the formation of sufficient gas to displace the volume of fluid withdrawn in excess of the 3,300 bbl. daily.

The volume of gas required to displace a barrel of oil under existing reservoir conditions was calculated at approximately 1,400 cu. ft. Consequently, by returning to the formation this volume of gas for each barrel of oil produced over 3,300 bbl. daily, theoretically, daily withdrawals can be sustained at any rate desired without decline of pressure. Also, by returning a greater volume of gas the pressure can be increased.

Since the volume of gas produced from the Tensleep formation is not sufficient, gas from the shallower horizons is drawn on to makeup any deficiency in volume needed to maintain volumetric balance in the reservoir.

Production schedules at this time call for a sustained oil withdrawal rate of approximately 5,750 bbl. daily, which is 2,450 bbl. in excess of the maximum which could be sustained by the energy of the hydrostatic head without decline of reservoir pressure. With 1,400 cu. ft. of gas being required to displace a barrel of oil, this excess would require the return to the formation of approximately 3,430,000 cu. ft. of gas daily to maintain pressures. At this time, the injection rate is averaging approximately 4,280,000 cu. ft. of gas daily. Of this, 2,304,000 cu. ft. is gas produced from the formation with the oil, and 1,976,000 cu. ft. is makeup gas supplied from the shallow gas sands. (Gas injection curve chart on page 68.)

Gas injection was started late in July 1941, and has been kept up continuously since then. As of October 1, this year, 2,531,582,000 cu. ft. of gas had been returned to the formation. Of this, 1,426,464,000 cu. ft. was formation gas and 1,105,118,000 cu. ft. makeup gas from the shallow sands. The total volume injected amounts to 177 per cent of the volume produced with the oil. Reservoir pressures at the start of operations averaged 2,034 lb. Average pressure at this time is 2,050 lb., an increase of 16 lb., or an average gain of 1 lb. per 158,223,250 cu. ft. of gas injected. (Reservoir pressure curve chart, page 65.)

Fluid withdrawals during the same period totaled 4,233,537 bbl. of oil, plus 24,078 bbl. of water, all the latter being from one well. Without injection of gas to supplement the energy of the hydrostatic head, it is estimated that not more than 2,610,300 bbl. of fluid could have been produced without decline of reservoir pressure, and approximately 1,623,237 bbl. of oil produced during this period is credited directly to gas injection.

Oil production prior to return of gas to the formation totaled approximately 3,919,070 bbl. Original reservoir pressure was estimated at 2,600 lb. By the time the pressure maintenance operations were started the pressure had dropped 566 lb., or about 1 lb. per 6,924 bbl. of oil produced as of October 1, 1943, with a total accumulative production of 8,152,607 bbl., the pressure has dropped 550 lb., or 1 lb. per 14,823 bbl. of oil produced.

There are two input wells. One of

these, the original well, is located near the top of the structure while the other is at a position about 275 ft. down-structure. In the former, the tubing is set with a wall packer placed at a selected point in the producing formation, about 120 ft. from bottom. Gas is injected through the tubing to that part of the formation below the packer, and simultaneously through the casing head and annulus to the part above the packer. By means of individual meter settings and check valves on the respective input lines, the volume and pressure of the gas injected to the lower and upper parts of the formation can be controlled separately.

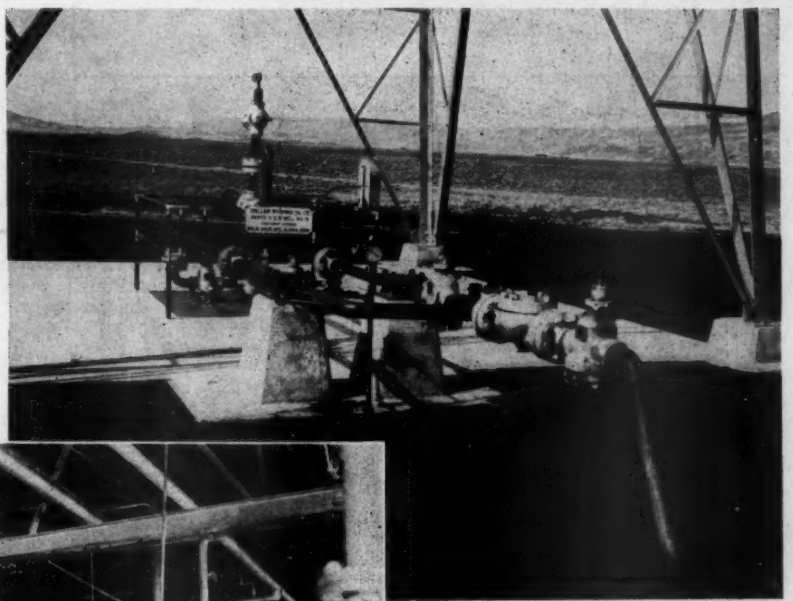
Selective Injection Benefits

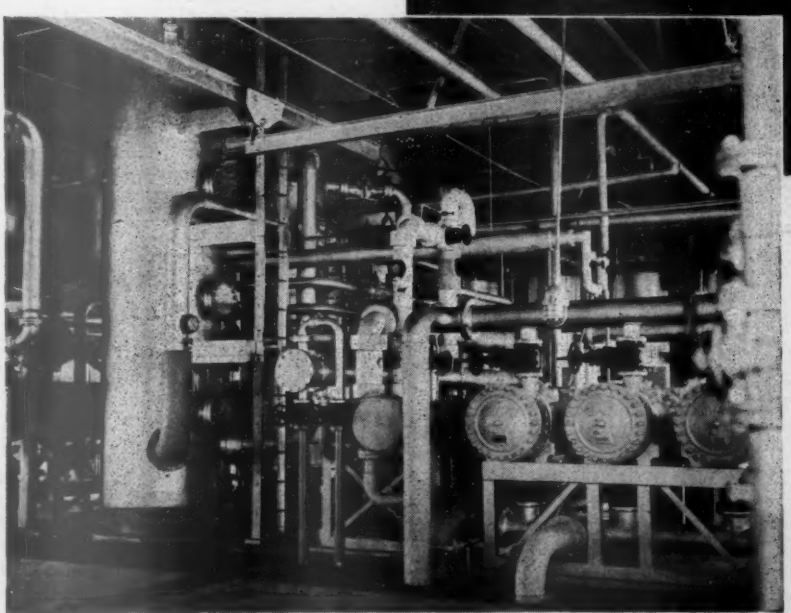
As previously mentioned, the formation has widely variable horizontal but negligible vertical permeability. Without mechanical control over the placement of injected gas, it would enter and channel through only those zones of highest permeability, resulting in an uneven distribution of the gas. This, in turn, would result in irregular movement of the water up structure.

It now is planned to set similar packers in producing wells so that the part of the formation from which the wells produce can be controlled and varied according to permeability conditions and zones into which gas is injected. This will permit control of gas-oil ratios in certain wells, and insure drainage of the tighter zones. With side-door chokes placed in the tubing strings above the packer, it will be possible to produce the wells either from above or below the packer.

Of the 4,280,000 cu. ft. of gas being returned daily to the formation, a little more than 3,700,000 cu. ft. is being injected through the up-structure input well. While the relative volumes to the lower and upper parts of the formation are varied, approximately 2,600,000 cu. ft. of this now is being returned through the tubing into the lower part of the

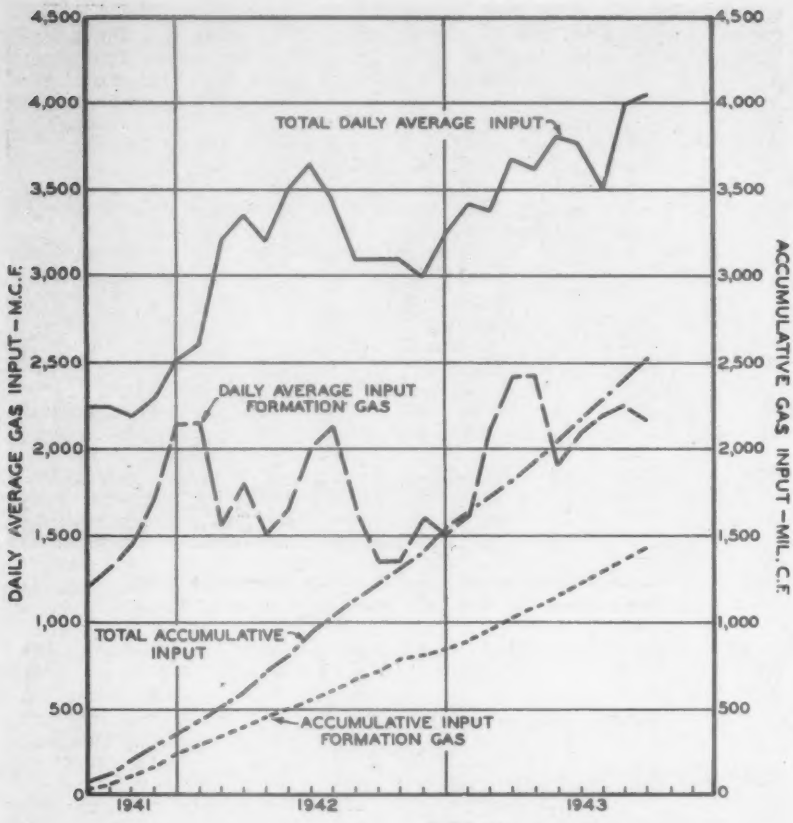
Precooler accumulator tank, first-stage accumulator tank, low-pressure vent tank, and second-stage accumulator tank





Above: Dual-zone gas-injection well showing separate meter runs to tubing and to casinghead input lines

Left: Gas-dehydration unit. Column at left is one of two dehydrators. Two horizontal columns are gas heater and gas cooler for reactivating alumina and fluorite beds. Three exchangers at right are compressor engine-jacket water coolers. Dehydration discussion pages 70 and 71



Gas-injection curves. *Discussion on page 66*

formation, with the remainder being injected through the casing to the upper part of the formation.

Approximately 500,000 cu. ft. of gas is being returned through the down-structure input well. Unlike the up-structure input well, this well does not yet have a packer setting in the formation, and all injection is through the tubing to the formation as a whole.

Down-Structure Gas Injection

Down-structure injection of gas is somewhat of a departure from generally accepted practice. By down-structure injection, the gas will have opportunity to work itself up-structure through the reservoir, and, in so doing, has excellent conditions under which to be dissolved into the undersaturated oil. In up-structure injection, theoretically the gas remains as a phase, since the area in contact with the oil is small and in a more or less static condition.

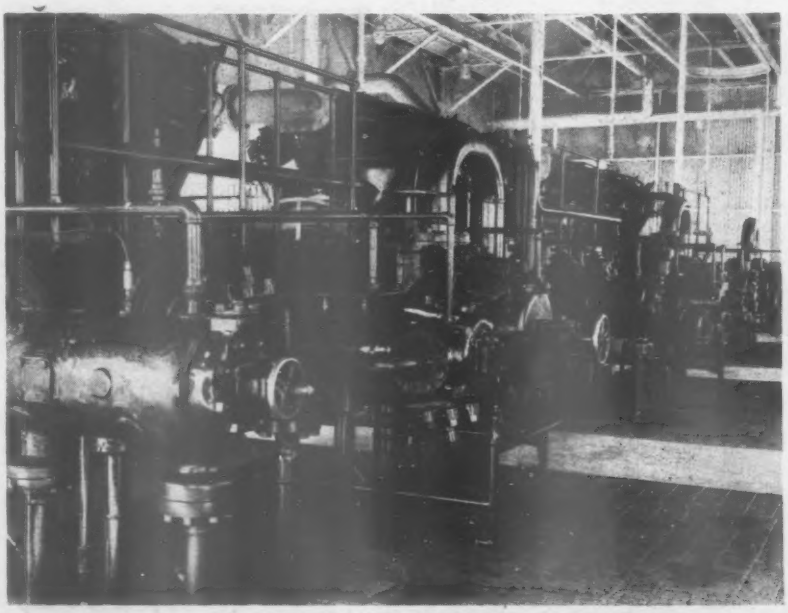
The production program is based on recovering a stabilized 36.2° gravity crude-oil product, leaving the light hydrocarbons in the gas to be returned to the formation. Largely due to high percentages of CO_2 and N_2, this gas has a comparatively high gravity of 1.311° before comingling with the dry makeup gas from the shallow sands. Gravity of the makeup gas is 0.651°, which reduces the average of the comingled gases to 0.981°.

Discharge pressure of the compressors to the gas return system is being maintained at 1,825 lb. At 11 lb. atmospheric pressure the absolute pressure of the gas at the tops of the input wells is 1,836 lb. Weight of the gas column in the hole is approximately 410 lb., making the bottom-hole pressure of the injected gas 2,246 lb., which is 196 lb. greater than the average reservoir pressure.

The gas-return system consists of a main 4-in. line extending to the meter run on the up-structure input well, with a 2½-in. take-off leading to the meter run on the down-structure input well. The former well has a main 3-in. meter run, which then is split into two individual meter runs for the tubing and the casing injection. The meter run on the down-structure well is 2-in. with 1-in. bypasses.

At the gas plant there are three Cooper-Bessemer 600-hp. gas engine-compressor units. These have angle-type, six-cylinder, two-cycle engines with three compression cylinders each. Rated capacity of each is 2,000,000 cu. ft. daily at 50-lb. suction and 2,500-lb. discharge pressures. Two of these units have been in operation since the plant was started, and prior to the installation of the third unit last July had to be operated near capacity at suction pressure of 50 lb. off the separators to handle the necessary volume of gas. The additional capacity provided by the third unit has permitted a reduction in the pressures held on the separators and the field system. Present operating pressure on the separators is 36 lb.

Makeup gas from the shallow sands is admitted to the system direct to the low-stage compression suction with the formation vent gas from the separators. Pressure of the combined



Three Cooper-Bessemer gas-engine compressors for returning gas to the producing formation. *(See description this page)*

gases then is boosted in three stages with the compressors operating in parallel through a common header system. In the first stage the pressure is boosted to 140 lb.; in the second to 485 lb., and in the final stage to 1,825 lb. Check valves on the final-stage discharge lines protect the plant should the final stage go out and permit field pressures to back up in the gas-return system. Makeup gas enters the plant through a scrubber on which a back pressure corresponding to that of the production separators is held. It is metered on the scrubber discharge, the volume passed being determined by the amount needed to make up the deficiency in the volume of formation gas.

All separators for the field are located in a central battery at the gas plant. The battery consists of four production separators, operated in parallel from a common inlet header, and two additional separators used primarily for testing individual wells. The latter are manifolded in the system so that they also may be used in regular production if needed. Unitization of the field, which consists wholely of government-owned lands under the supervision of the United States Geological Survey, makes separate handling and gaging of production unnecessary, except in testing individual wells. For the latter, piston-type fluid meters with a straight reading type register are placed in the fluid-discharge lines from the test separators to the crude outlet header from the production separators. Vent gas from the test separators is measured through an orifice meter in each of the vent lines which discharge to the common vent-gas header. A master orifice meter is installed in the vent line to measure the gas from all the separators.

Crude Stabilization

The production from only two wells is metered separately. One of these wells is located outside the unit, while the other is a well in the unit which has been making some water. In each instance, the production is metered at the well, using a piston-type meter similar to the meters on the fluid outlets from the test separators.

Production of both oil and gas is delivered direct to the plant through two 8-in. lines which loop the field, and which come together at the plant into the separator inlet header. The production lines are paralleled by two 4-in. testing lines which are manifolded into the two test separators so that either or both separators can be used for testing any well.

In the crude-stabilization operation, the fluid discharge from the separators is picked up by a centrifugal pump and passed through two banks of oil to oil exchangers and a steam heater to a flash tower. Temperature of the crude from the separators is 78° F. Through the exchangers this is raised to 150° F., and through the steam heater into the flash tower to 230° F.

Approximately 70 per cent of the gases recoverable at atmospheric pressures is taken off the production in the separators. Any remaining gases that would be released at atmospheric pressures and temperatures are vented from the flash tower. The latter gases are passed with the separator vent gases to the intake of the low-stage compression.

Reflux is obtained by cooling the low-stage compression discharge gas. This product is discharged from the accumulator at 140-lb. pressure to a steam-heated vent tank held at 60-lb. back pressure, in which the lighter hydrocarbons are thrown off under temperature control of from 82° F. to 106° F. Comingled with the condensate formed by cooling the hot, mixed flash-tower and separator gases passing to the low-stage compression intake and collected in the precooler accumulator (see flow diagram) from which condensate, it picks up the heavier ends. This product then is cycled to the top of the flash tower.

The crude stream from the flash tower is cooled, first in the oil-to-oil

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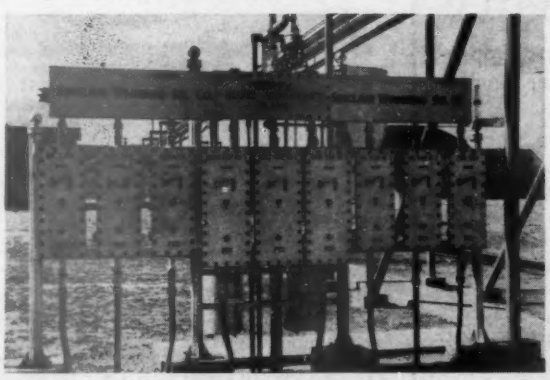

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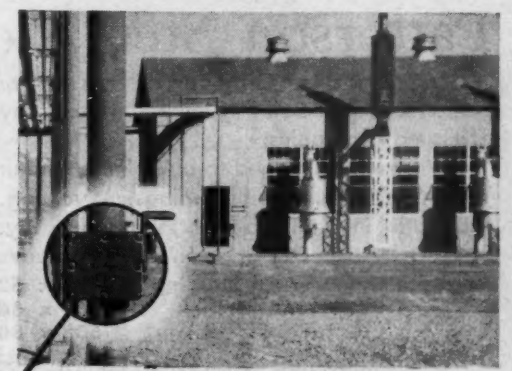

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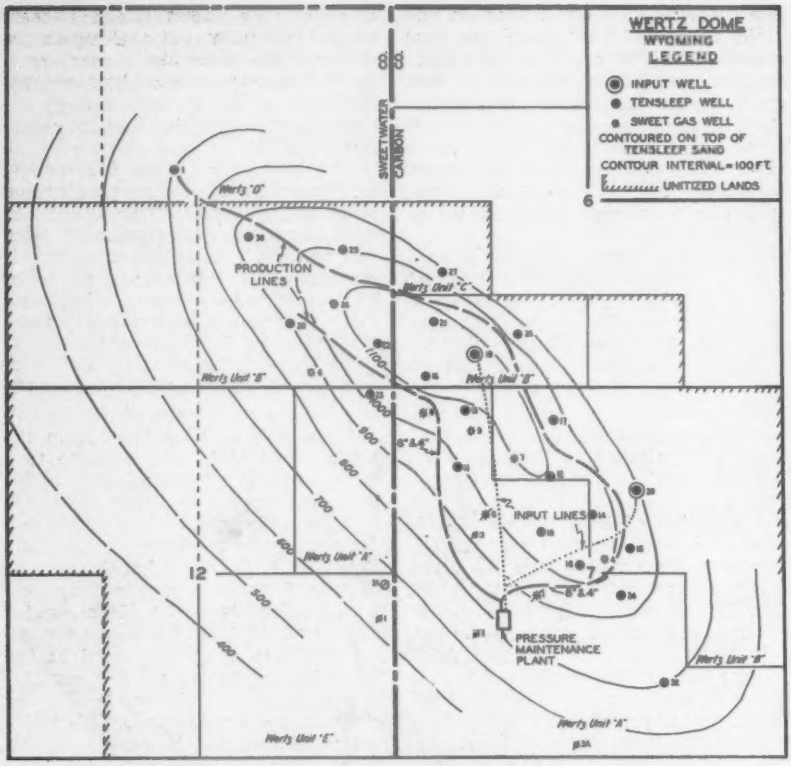

Wertz dome field showing producing and input wells and production gathering lines and gas return system

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Plant No. 13, Seminole, Oklahoma, in 1927
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exchangers with the incoming cold crude, and then in a final water-to-oil cooler, to 82° F., at which temperature it is run to storage. Gravity of the crude after stabilization is 36.2° Be., 1° higher than the initial gravity. This in itself adds 2 cents per barrel to the value of the product. Also, through controlled stabilization most of the heavier fractions that otherwise would be lost by evaporation in conventional handling of the crude are saved. It is estimated that the stabilization operation is adding from 30 to 40 bbl. per day to the crude stream.

Before pressure maintenance, gas produced with the oil had no commercial value due to the high percentage of inert gases (CO_2 and N_2), and its corrosive qualities caused by the hydrogen sulfide. The increase in gravity and the added volume to the crude stream in the stabilization process approximately carries the current operating expenses of the plant, and utilizes hydrocarbons which otherwise would be economically worthless.

Before final decision was made to build the pressure maintenance plant, much uncertainty was felt whether the formation gas could be processed without excessive complications from corrosion to equipment. The gas not only has a fairly high percentage of hydrogen sulfide but also carries a large water-vapor content. This, if allowed to condense in the system, would form sulfuric acid in the presence of the hydrogen sulfide, and as a consequence would present great potential difficulties.

A complete analysis of the gas follows:

Components	Per cent by gaseous volume
Hydrogen Sulfide (700 Gr./100 cu. ft.)	1.11
Oxygen	0.
Nitrogen	4.09
Carbon dioxide	52.00
Methane	26.80
Ethane	6.35
Propane	5.35
Isobutane	.79
N-Butane	2.05
Isopentane	.49
N-Pentane	.54
Hexane and heavier	.43
Total	100.00
Specific gravity*	1.2082

*Calculated, based on 52 per cent carbon dioxide and 700 grains of H_2S per 100 cu. ft.

Operation of the gas system, including dehydration, is designed to maintain the temperature of the gas above the vapor point of the water condensate and thus prevent the formation of condensate in the system. Dehydration is accomplished with condensate in the vapor form, and this is removed as free water at a place where there can be no danger. As a further precaution against the possibility of condensate forming and collecting in the system ahead of dehydration, all lines from separators

and other vessels are elevated. Inlets to coolers are on the top sides, and to them all lines are directed straight downward. Cooler outlets are on the bottom sides, and lines from them pass straight downward, and thence turn upward to inlet points of accumulators. At low points in the cooler outlet lines, and at any other low points in the system "stingers" are placed for quick removal of any condensate that might collect. As a consequence, after more than 2 years of operation, the plant has shown no signs of corrosion.

Gas Dehydration System

Dehydration of the gas takes place between the first and second stages of compression, and is acomplished by charging the gas to a column containing one fluorite and three activated alumina beds. There are two of these columns operating in alternating 24-hour periods, with one being reactivated while the other is in use. The columns are reactivated by cycling preheated gas through the columns to take up the condensate vapors from the beds, and cooling the gas and collecting the resulting condensate in a receiving tank for removal from the system. Gas in the system is dehydrated to a dew point of 14° F. below zero at the discharge pressure of 1,825 lb.

Not only is the temperature of the gas maintained above the vapor point of the condensate, but close control is kept of all necessary changes. At points where the gas is cooled for various reasons, the temperature never is dropped below the condensate vapor point.

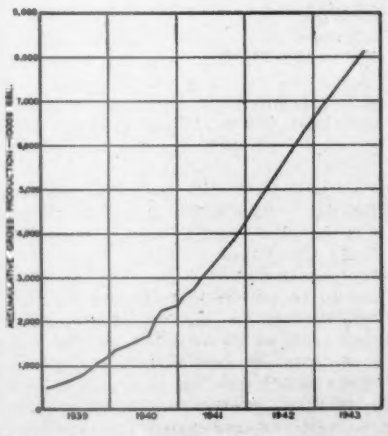
The gas comes off the production separators at a temperature of 68° F. Blended with the hot (180° F.) gas vented from the flash tower, the temperature is raised to 100° F., but to get the needed reflux for the flash tower, the temperature is reduced in water-to-gas coolers, the product being collected in the precooler accumulator (see flow diagram on page 61).

Gas discharged from low-stage compressors is passed through coolers to obtain additional reflux and enters the dehydration unit at 82° F., going first through a dehydrator scrubber and thence through the column of activated alumina and fluorite beds. Temperature of the gas is reduced only 2 degrees during dehydration.

Between the second and final compression stages the gas again is cooled to approximately 80° F., not to obtain any liquids but primarily to liven the gas and make possible handling of a greater volume to the high-stage cylinders. An accumulator is placed on the outlet line of the coolers as a precaution should any condensate form, but very little, if any, ever is obtained.

Electricity is used almost exclusively for power requirements in the plant. Live steam is used primarily for operation of the turbine-driven generators. There are two generator units, one serving as a standby. Each generator is rated at 480 volts, 125 kva., 100 kw. with 1,200 r.p.m. The turbines operate at 250-lb. inlet and 25-lb. exhaust pressure with 4,954 r.p.m.

The steam plant contains two 125-



Accumulated production Wertz field by months (see page 66)

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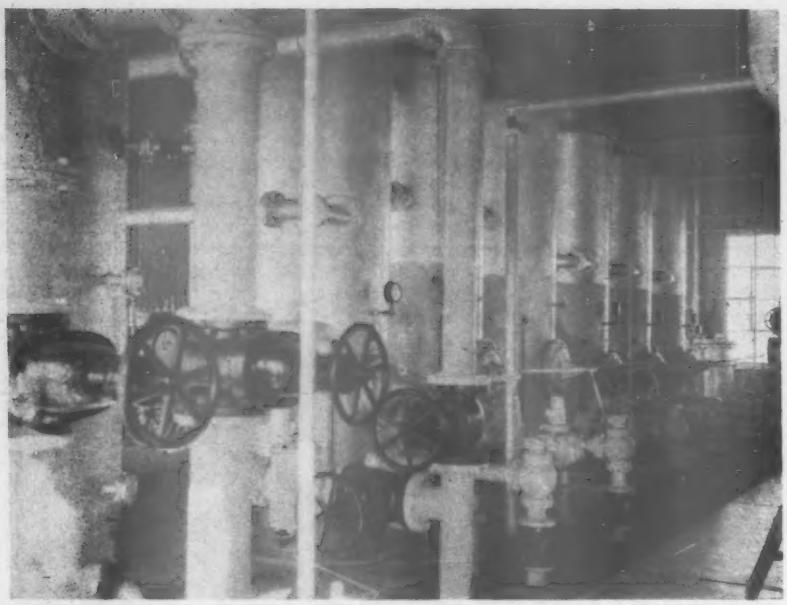

Central separator installation housed in gas and oil processing plant building. Test separators with liquid meters on fluid discharge are third and fourth from right. (See page 69)

hp., 300-lb., working-pressure, locomotive-type boilers. Exhaust steam from the generator turbines at 25-lb. pressure is used heating, including gas and oil heaters and other plant needs. Steam condensate is returned in a closed system to an accumulator at a temperature of 160° F., from where, with makeup water, it is circulated to a deaerator and preheated with live steam to 198° F. for boiler feed water.

Available water for boiler feed water makeup, cooling and other plant use has a hardness of 32 grains. By treating the water with soda ash and lime, the hardness is reduced to zero. Makeup water for engine-jacket cooling is supplied from steam condensate.

Cooling water from the induced-draft tower is circulated through the gas coolers, final oil cooler, dehydrator cooler, the engine-jacket water coolers, and back to the tower. All coolers are of the shell-and-tube type. Cooling of the engine jackets is dependent, however, more on the velocity of the jacket water through the jackets than on the actual cooling of the water in the coolers. The circulation of the jacket water is at such rate that the temperature is maintained from 130° F. to 134° F. The jacket water system is entirely closed.

Plant Control

Plant operation is semi-automatic, and ordinarily only one man is needed on each shift. Operation of the project is joint between the production and gasoline departments. With the exception of the regulation of the flow of individual wells in the field, which is handled by a resident production engineer, all gaging and handling of crude oil is done by operators at the plant. Obviously, manpower requirements are minimum. All electrical controls are located at a central point outdoors. An electrically operated emergency shutdown system has been provided. Switches are placed at three convenient points in the plant and yard. Pulling any one of these cuts off the fuel to the boilers, quenches the boiler fire boxes with steam, shorts the magnetos on the engines, shuts off the incoming gas and turns all production through the separators direct to storage instead of through the plant.

Fuel for boilers is obtained from the vapors flashed from the vent tank in making reflux stock. This gas, volume of which amounts to approximately 65,000 cu. ft. daily, is the only processed gas not returned to the producing formation. These vapors must be augmented with sweet gas drawn from the shallow gas wells. Sweet gas is used exclusively for engine fuel.

Because of severe cold weather during winter which would radically affect the operation of the plant and temperature control of the system, all equipment is enclosed in steel buildings. These are equipped with thermostatically controlled heaters, employing exhaust steam, which automatically maintain a uniform temperature in the buildings.

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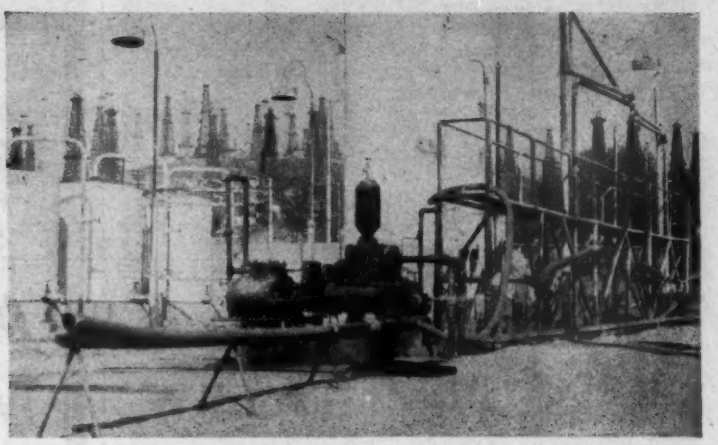
USING a common light-weight oil drum, the employes of a refinery have contrived a useful dump bucket. Pipe nipples inserted in the side bunghole and welded to the side opposite form the trunnions for attaching the bail. This bucket is employed to handle scrap, waste and other material commonly moved by a wheelbarrow.

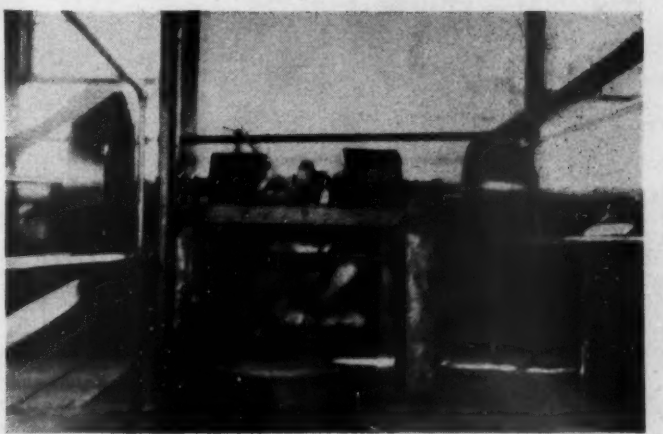


Protection for Loading Hose

THE loading, or unloading hose employed with truck tanks is assured of a longer usefulness if kept from contact with the ground. A trough made by splitting a joint of 6-in. pipe and fitted with legs to raise it to a convenient height keeps the hose straight and free of a greater part of the normal accumulations of sand and abrasives.

Free-Wheeling Unit for Pump Drive

A FREE-WHEELING unit salvaged from an old Chevrolet automobile is being utilized in a compressor plant in a Rocky Mountain district field to provide an auxiliary power drive for the gas-engine jacket-water circulating pumps. Normally, the pumps are operated by electric motors through the belt drive to the large belt wheel (left), the shaft extension of which is direct-connected to the high-speed side (left) of the free-wheeling unit. The smaller belt wheel (right), mounted on the end of the shaft from the low-speed side of the unit, is belt driven off the compressor-engine flywheel. Operating at slightly slower speed than the electric-motor drive, the gas-engine drive side of the free-wheeling unit idles while the electric motors are running. However, at any time the electric power should fail, or should the motors be cut out for any other reason, the gas-engine drive will take hold.



Safety for Loaders

FOR the safety and convenience of loaders working on top of tank trucks, Standard Oil Co. of California has designed and is installing overhead hand rails at all the company's large tank-truck loading racks. This rail gives the loaders a conveniently located support useful in preventing accidents, particularly during wet weather when the truck tops may be slippery. The overhead hand rail idea occurred almost simultaneously to two Standard employes, J. E. Craft at Eugene, Ore., and A. T. Billingsley at Seattle, Wash.

U. S. Army Air Corps

TODAY

Garlock is helping America's war industries and essential civilian industries maintain top-speed production by supplying them with Garlock products that give long, dependable service.

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Engineering Fundamentals

No. 116

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

DIRECTIONAL-DRILLING TECHNIQUE

A primary requirement for the proper control of a directional-drilling operation is an accurate map of the course of the hole as the drilling progresses. The exact nature of the map required will depend upon the particular purposes for which the hole is being deflected.* In deciding the exact procedure to follow in plugging back and redrilling the lower portion of a well, a map and complete geological information are fundamental data which determine the depth to which it is advisable to plug back, set a deflection tool and begin the redrilling. Such data also influence the type of tools used in the redrilling operation. In drilling a relief well to kill a wild well, it is also very helpful to have a map showing the course of the hole in the wild well. However, such data are not always available on the wild well, since it is impossible to obtain such information after the well has gone out of control. Many times, ordinary deviation data must be relied upon in estimating the probable location of the bottom of the wild well, the accuracy of such an estimation depending upon how closely the well was kept on a vertical course when drilled. At least, after determining as accurately as possible the location of the bottom of the wild well, a continuous map must be kept up to date on the course of the relief well in order to steer it accurately to the objective (in this case, the bottom of the other well.)

A second requirement for directional drilling is a suitable deflection tool along with special bits and other auxiliary tools. A deflection tool is a mechanical device which is placed in the hole to cause the well bore to deflect from its course.

The deflection tool selected in any particular case depends upon several factors; principally the type of formation adjacent to the deflecting point. The removable whipstock is the most commonly used deflection tool in directional-drilling operations. It consists of a wedge-shaped steel casting having a tapered concave groove down one side to guide the whipstock bit into the wall of the hole. The whipstock is provided with a chisel point at the bottom to prevent turning, and with a heavy collar at the top by means of which the tool is withdrawn from the hole. Various removable whipstocks vary in certain small features; some are designed for soft formations and others for hard formations; some provide a fluid passage to the bottom of the tool for use in circulating cuttings out of the hole in order to set the tool on bottom, while others do not have this feature. For sidetracking in soft formations, a special spiral drag bit is used in conjunction with the whipstock. In hard formations, a special cone rock bit is used.

The whipstock is run into the hole and turned in the proper direction to deflect the bit along the desired course. This is accomplished by using drill-stem orientation methods as described in connection with directional well surveying methods in Installment 113 of this series. The ring of the whipstock is rigidly attached to the string of drill pipe by means of a shear pin which screws through the ring into the shank of the drilling bit. This prevents rotation of the whipstock with respect to the drill string while going into the hole.

Just off bottom, the drill-pipe string is raised and lowered several times to work the torque out of the string. The whipstock is then set down on bottom with sufficient force to shear the pin holding it to the bit shank. The strength of the shear pin is sufficiently great that the chisel bottom of the tool is imbedded in the bottom of the hole before the pin breaks. Thus, the chisel bottom holds the whipstock in the desired position during rotation of the bit on the grooved surface of the whipstock, provided that the bit is rotated slowly so as to gradually work out into the formation without binding. About two joints of small-diameter drill pipe have been placed just above the bit to gain flexibility at this point. Knowing the length of the whipstock used on a given job, the operator can, by keeping an accurate check on footage drilled after setting the whipstock, tell when the bit has reached the bottom of the whipstock. At this time the bit is resting entirely on formation. Three or four points of weight are now applied to the bit which causes the section of small and flexible pipe just above the bit to bow toward the whipstock and guide the bit off in the direction started by the whipstock. Using regular drill pipe only about 15 ft. of hole can be drilled below the whipstock in this manner, since the tool joint at the top of the bottom joint will engage the ring on the whipstock and prevent going deeper before removing the whipstock from the well. If this is the case, the drill pipe is pulled, the whipstock removed, and the pipe run again (flexible joints still at the bottom of the string) and about 25 or 30 ft. of hole drilled. Often this extra round trip with the drill pipe is eliminated by using two joints of external flush-joint drill pipe just above the bit and whipstock, which allows the drilling of about 40 ft. of hole below the whipstock. This not only saves time, but often actually aids in maintaining the desired deflection since the whipstock remains in the hole to act as a guide.

In either of the above cases, whether or not the follow-up run is required, the hole is surveyed for both inclination and direction after the whipstock is removed from the hole.

Since the diameter of the whipstock bit is necessarily less than that of the finished hole, the rathole drilled below the whipstock is next reamed out to gage using a special pilot reaming bit. This type of bit has a central projection, extending ahead of the cutting edges, which holds the reaming bit in line with the smaller rathole and assures that the axis of the larger reamed hole will coincide with the axis of the rathole. Thus, it is important to have accurate measurements and mark the kelly as an aid to determining definitely that the pilot is actually in the top of the rathole before starting the reaming.

Occasionally, the use of one whipstock does not produce sufficient deflection and a second whipstock will be set at the bottom of the reamed rathole below the first whipstock to further build up the angle. In any given situation, though, the exact procedure followed after deflecting a hole depends upon the results obtained from the first whipstock setting, upon the nature of the formations, and the object of the job.

*Various applications for which directional drilling is used were given in Installment 115.

Series prepared by Glenn M. Stearns, associate professor of petroleum engineering, University of Oklahoma

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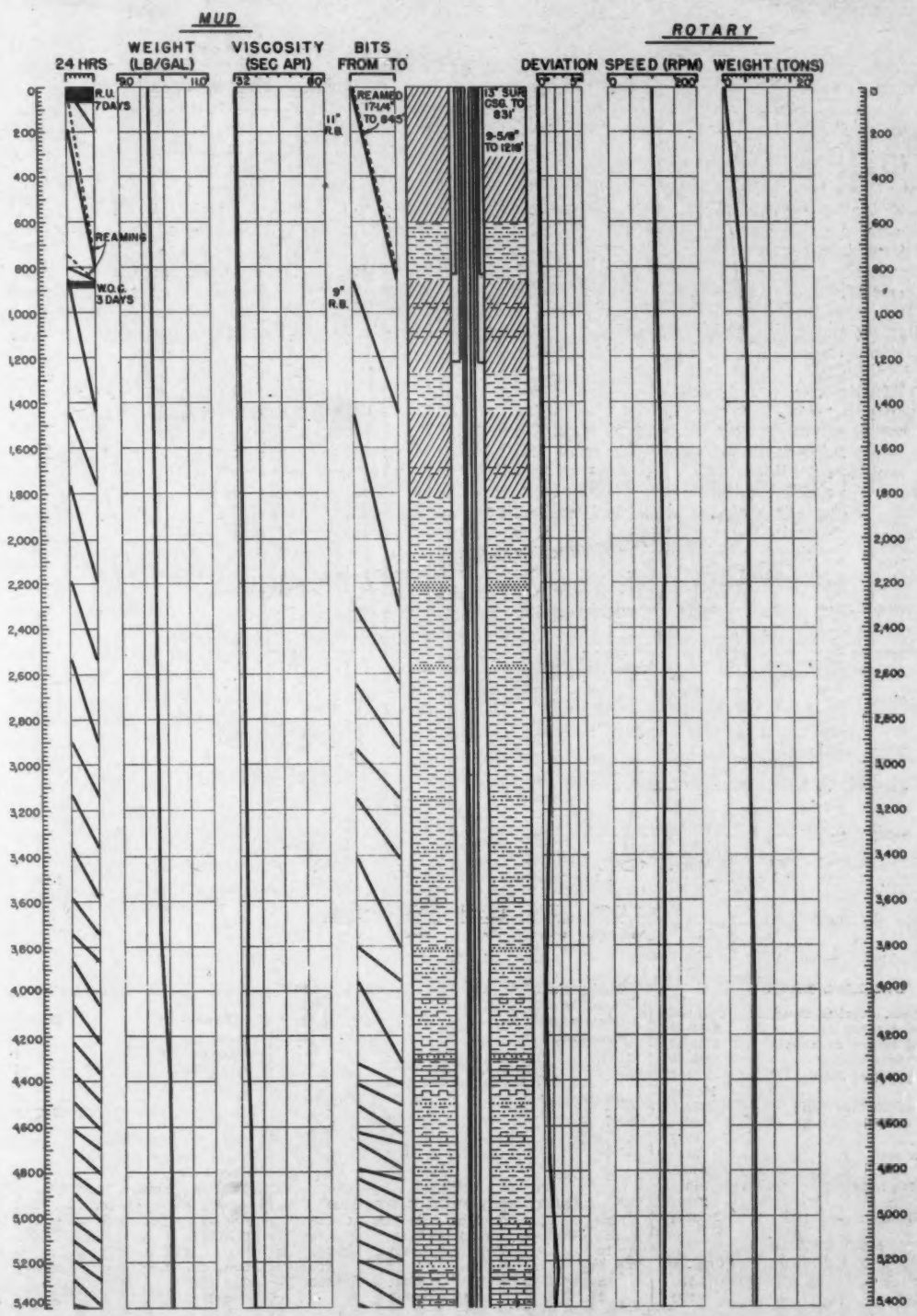
PRESSURE GAGES

Discovery Well, West Moore Pool, Cleveland County, Oklahoma

MID-CONTINENT PETROLEUM CORP. 1 EDGAR HARRIS
NE SE SW 29-10n-3w

CONTRACTOR
Loffland Brothers Co.



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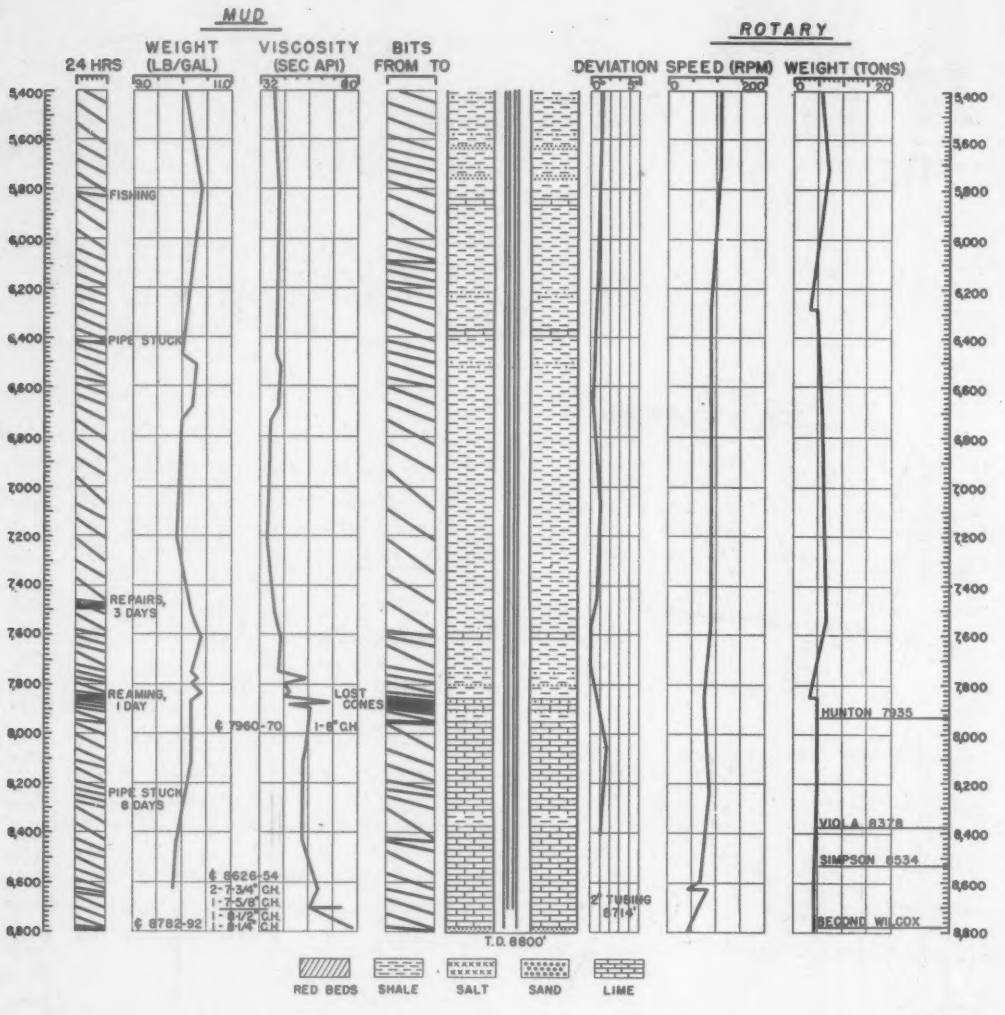
Journalog

Discovery Well, West Moore Pool, Cleveland County, Oklahoma (Continued)



DRILLING DATA

Well elevation, derrick floor, ft.	1,205
Date started rigging up	6-16-43
Date started rotary drilling	6-23-43
Date set surface casing	6-28-43
Total rotary time, days	158
	Hours
Rig up and surface pipe	142
Logging, electric	24
Coring	69½
Drill-stem test	24
Repairs	440
Looking for hole	360
W.O.C.	264½
Actual drilling time	2,185¼

MUD USED

Type	Sacks
Aquagel	1,500
Baroid	900
Quebracho	32
Stabilite	180
Caustic soda, lb.	3,700
Phosphate, lb.	100

CORE HEADS USED
(Hard-formation type)

Number	Size (in.)
2	7¾
1	7⅞
1	8½
1	8¼
1	8

CASING AND TUBING RECORD

Size (in.)	Weight (lb.)	Depth (ft.)	Cement (sacks)
13	38	831	800
8⅝	40	1,218	800
5½	17	8,784	1,200
2	4.7	8,714	....

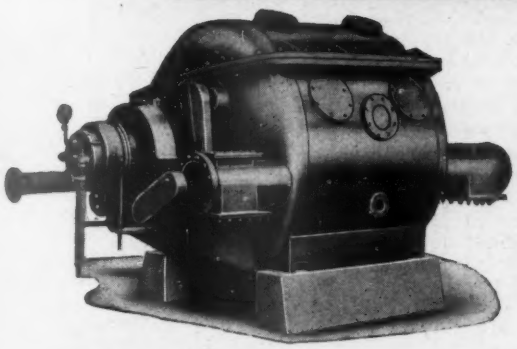
BITS USED

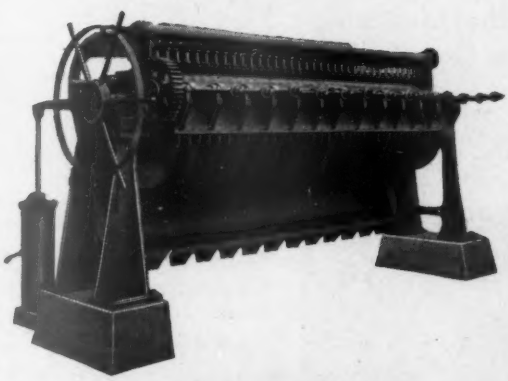
Type—	Number	Size (in.)
Rock bit	1	11
Reamer	1	17¼
Rock bit	61	9

PRODUCTION TEST

Date	12-8-43
Time flowed, hours	1
Choke	13/64
Tubing pressure, lb.	500
Casing pressure, lb.	2,950
Separator pressure	160
Oil, bbl.	281
Water	None
Gas, cu. ft.	2,233,000
Gas/oil	7,948:1
Gravity	47.5

OUF





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12-OUF-8

REFINING

"More 100-Octane Gasoline" Is Keynote of Meetings

BORGER, Tex. — "More 100-octane gasoline and faster" was the keynote of a 3-day meeting held last week for employes of Phillips Petroleum Co. and L. O. Stocker Co. engaged in the aviation-gasoline program under way in the Borger area. Meetings were held in the high school auditorium at Phillips, in charge of Lt. Comdr. C. L. Day, representing the Army and Navy, the Petroleum Administration for War, and the War Production Board.

Commander Day said the total Phillips production of 100-octane gasoline at the present time is sufficient to drop 600 tons of bombs on Berlin daily. Upon completion of the additional facilities now under way, it will be enough to drop 800 tons of bombs daily.

Smiths Bluff Celebrates Twentieth Anniversary

BEAUMONT, Tex.—Nearly 450 employes of Pure Oil Co.'s Smiths Bluff refinery observed the twentieth anniversary of their plant last week. Highlight of the birthday celebration was a dinner program at the Beaumont Hotel, honoring 78 employes, with service records of 20 years, or more. Among the speakers were C. B. Watson, vice president; J. P. Langfitt, manager of refineries; D. E. Sullivan, chief engineer, all of Chicago; Munger T. Ball, president of Sabine Towing Co., Port Arthur; R. L. Vernor, and J. S. Allen, manager and superintendent of the Smiths Bluff plant, and G. C. Morris, marketing and transportation manager, Beaumont. Master of ceremonies was J. H. Heslar, assistant general maintenance foreman.

Vernor introduced individually each man with 21 or more years of service and presented a 5-star 25-year service pin due at the time to the mayor of Nederland, H. C. Farris, assistant maintenance foreman at Pure's plant.

Smiths Bluff is the Pure company's largest refinery with a daily capacity of more than 50,000 bbl. Recently, the construction of a new aviation gasoline plant and a Pure Oil Thermofor catalytic-cracking unit, also for making aviation gasoline and raw stocks for synthetic rubber, have increased the expanse and importance of the plant.

McBride Finishes Gathering System in Rio Grande Area

SULLIVAN CITY, Tex.—McBride Refining Co. has completed a gathering system for the Sullivan City field in Hidalgo and Starr counties at a cost of $12,000. Two 3,000-bbl. storage tanks have been built and the gathering system is available for all leases in the field, H. L. McBride announced. The line replaces trucks which formerly moved crude from the field to La Blanca refinery near Edinburg.

Colonial Beacon Celebrates Remarkable Safety Record

The Everett, Mass., refinery of Colonial Beacon Oil Co., which recently won the fifteenth annual nation-wide Petroleum Industry Safety Contest among refineries in Group B, topped its former safety record by completing 2 years and over 2,000,000 man hours of work December 13 without the loss of an hour because of accident.

In commemoration of this record and its importance in winning the war, an oil-industry luncheon was held at the Statler Hotel in Boston, Mass., December 14.

L. E. Ulrope, president of Colonial Beacon, presided. Chester F. Smith, president of Standard Oil Co. of New Jersey; Frank W. Pierce, director of Standard Oil Co. (New Jersey); Howard Milliken, president of Everett Refinery Employes Association, and Paul Shea, manager of the Everett refinery, were among the scheduled speakers.

The guest list included Gov. Leverett Saltonstall, of Massachusetts; Mayor Tobin, of Boston; Mayor Lewis, of Everett; officials of the National Safety Council; officers of the Army, Navy and Coast Guard concerned with war production and plant safety in New England; the commissioner of public safety of Massachusetts; officials of the Petroleum Administration for War, and leading oil men in the Boston territory.

DPC Announces Increases In Contracts for Facilities

WASHINGTON, D. C.—Jesse Jones, secretary of commerce, announced last week that Defense Plant Corp. had authorized an increase in its contract with Crown Central Petroleum Corp., Baltimore, Md., to provide additional facilities at a plant in Harris County, Texas, at a cost of approximately $2,100,000, resulting in an over-all commitment of approximately $9,200,000.

The contract with Mohawk Petroleum Corp., San Francisco, Calif., also has been increased to provide additional facilities at a plant in Kern County, California, at a cost of approximately $1,000,000, resulting in an over-all commitment of approximately $4,000,000. In both cases the refineries will operate these facilities, title remaining in DPC.

R. L. Bernor, plant manager, presenting 25-year pin to H. C. Farris, assistant maintenance foreman who is also mayor of Nederland, Tex., location of the Smiths Bluff refinery

District 2 Refiners Meet to Discuss Renegotiation

CHICAGO.—Refiners of District 2 holding government contracts or subcontracts subject to price renegotiation met here Tuesday, December 14, to discuss procedures and instructions relating to the work involved in such negotiation. The meeting was sponsored by Navy Price Adjustment Board.

Paul G. Blazer, chairman of the petroleum refining committee for District 2, like those in some other areas was held to save time of industry members and expense of going to New York to discuss renegotiation with the board.

Since renegotiation responsibility devolves ultimately on company chief executives, they were asked to attend, accompanied by comptrollers or cost accountants, Renegotiation is described as not merely a cost-accounting procedure but one involving presentation to the board of the company's entire operations.

Paul Ryan, member of the Navy board, and long active in petroleum industry activities, presided.

Renegotiation instructions were carefully reviewed to simplify the work and assist in preparation of required reports. Wer contracts exceeding $100,000 are now subject to such renegotiation. Legislation is pending in Congress to increase the minimum to $500,000.

Standard of Indiana's New Toluene Plant Operating

CHICAGO.—Enough "T for TNT" to make hundreds of tons of block busters daily is now being produced by Standard Oil Co. of Indiana at its new toluene plant at Whiting, Ind., the company announces. From this recently completed unit of the Whiting refinery will come more toluene for bombs for America's war planes than all sources in the United States produced in World War 1, according to the company.

It is pointed out that the first commercial hydroformer, built at Texas City, Tex., before the war to make high-quality gasoline and a forerunner of plants now producing toluene, was developed and designed by Standard of Indiana, its subsidiary, Pan American Petroleum & Transport Co., and a construction company.

Standard plans to use the hydroformer of its new Whiting toluene plant after the war to make "better gasoline than we ever made before."

High-Test Gasoline Shortage Constant Threat, Says Ickes

WASHINGTON, D. C.—A shortage of 100-octane gasoline that would hobble combat operations of United States and Allied air forces has been a constant threat since Pearl Harbor, Petroleum Administrator for War Harold L. Ickes says.

Even though new 100-octane plants are now going into operation, the race to increase production as fast as the demand grows has not yet been won.

Ickes disclosed that the 100-octane program went through a crucial period when few new plants were coming into production and means had to be found to meet the mounting demand by squeezing additional production out of existing facilities.

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PIPE LINES

Tank-Car Regulations Are Relaxed for Oil Shippers

WASHINGTON, D. C.—Expedition of movement of oil is expected to result from action of the Office of Defense Transportation which permits shippers of petroleum and its products to remove tank cars from the East Coast movement and use them for shipments to the West Coast. An existing ODT order froze all tank cars in the East Coast petroleum movement as of December 29, 1942, and all cars subsequently put into such service. Records showed some 70,000 tank cars affected on that date.

ODT officials said it would have little or no effect on the East Coast supply situation because pipe lines will more than compensate for any drop in tank-car oil movement.

In relaxing the so-called freeze order, A. V. Bourque, associate director of the Division of Petroleum and Other Liquid Transport in Charge of the Section of Tank-Car Service, said that the essential movement to the West Coast has grown to such an extent that it is necessary to provide tank cars quickly to meet emergency demands. In view of the fact that many shippers are shipping to both the East and West coasts, he continued, it was deemed advisable to amend the freeze order so as to permit uninterrupted movement to either coast without the delay involved in getting permits.

Bourque emphasized that the cars shifted must be used in "essential authorized" petroleum movement to the three West Coast states and must under no conditions be utilized for shipments to any interior points without an ODT permit.

Pipe Line Systems Are Extended in Kansas

Additional pipe-line facilities are being constructed in Kansas. Crude Oil Corp., Inc., of Illinois, which recently completed 25 miles of 4-in. pipe line from the Cunningham field to the Whelan pool of Barber County, is laying 4-in. lines to the Lake City and Sun pools of Barber County, Kansas. This gives that county its first pipe line outlet for oil.

Skelly Oil Co. is building 7 miles of 4-in. pipe line from the Jordan pool to the Farmington pool south of Macksville in Stafford County.

Stanolind Pipe Line Co. is laying about 10 miles of 4-in. line in western Ellis and eastern Trego counties to give the Ellis pool a pipe line outlet. Stanolind extended the line serving the Solomon pool.

Pipe Laying Completed for WEP 20-in. Products Line

With the laying of the last joint of pipe on December 8, the 20-in. products pipe line of War Emergency Pipelines, Inc., now extends continuously from the Gulf Coast to the East Coast. Only 225 days were taken for constructing the project since it began April 27. Building of the WEP 24-in. crude-oil line covered a period of 350 days which included winter and spring conditions when progress was impeded.

The WEP products system consists of 1,475 miles of 20-in., 62 miles of 16-in. and 115 miles of branch feeder and distribution lines of diameters from 6-in. to 14-in. In addition 54 miles of 8-in. is being laid from Beaumont, Tex., to Lake Charles, La., of which 15 miles has been finished. This feeder line is due for completion in January or February.

During the period when throughput of the extension of the WEP 24-in. crude line is being increased eastward from Norris City, Ill., movements of 20,000 bbl. daily of crude are scheduled for transportation to the East Coast via Ohio Oil Co. and Tuscarora Oil Co., Ltd., pipe-line systems. Shipments from Longview, Tex., through the 24-in. line during the past week have been close to its rated capacity of 300,000 bbl. daily.

River Crossing Gangs On Tennessee Gas Line

Although no main-line construction of Tennessee Gas & Transmission Co. Texas-West Virginia 24-in. gas line is scheduled to start before the beginning of 1944, according to reports, work is going ahead at river crossings.

Following the celebration, December 4, to commemorate the start of the undertaking, construction operations have been proceeding at the Cumberland River crossing where

three 16-in. lines are to be laid 10-ft. apart under the direction of A. M. Garber, superintendent for Williams Brothers Corp.

George Allen, superintendent, is starting a gang near Springfield, Tenn. Guy S. Connors, vice president and general superintendent, is moving his office from Cincinnati, Ohio, to Monroe, La., at the end of December. H. L. (Red) Davis, superintendent, will supervise Williams Brothers work on the Tennessee project from Monroe.

More West Texas Lines May Relieve Shortage

WASHINGTON, D. C.—Additional pipe lines from West Texas are expected to be one sequel to the West Coast oil shortage, which is declared to be as serious as any ever faced by the East. Major relief for the immediate future will have to be provided by tankers from Texas and South America, government officials say, but more pipe lines from West Texas seem to be a logical prediction for the long term.

Increased military demands have already resulted in pressing several thousand additional tank cars into service to supply requirements westward. It is understood that every effort will be made to increase to the maximum the tank-car shipments that can be handled by western rail lines. However, these limes have limitations which were not met in eastern shipments. Some western roads operate on single tracks, substantially cutting down the movement that can be effected.

This limitation necessarily places a lot of the load on tanker shipments from the Gulf and probably Venezuela, with the possibility of certain military requirements being filled through the Middle East. An increasing number of large and fast new ocean-going tankers are now being turned out and may bring some relief.

Katy Field Gas Line Looped To Fill War Industry Needs

HOUSTON, Tex.—Looping of the Katy field main pipe line is under way as natural-gas demands of war industries in the Houston area continue to grow. Eleven and a half miles of 12-in. line is being installed as a loop to the existing 12-in. pipe in the 45-mile line.

The Katy line extends from the Katy gas fields to the Goodrich-Houston main line. It passes through the Satsuma gas field and is linked to the Fairbanks gas field by means of a short 8-in. lateral line.

The loop begins just upstream of the 10-in. main-line gate valve at the point where the original line is increased to a 12-in. line near the Satsuma field. It will extend eastward along the present 12-in. portion of the line to approximately mile post 30.1, lying entirely within Harris County, near and north of the city of Houston.

Designed for additional pipe line capacity to enable United Gas Pipe Line Co. to supply natural-gas requirements of plants engaged in the manufacture of synthetic rubber, progress on the loop line indicates an early completion date.

Besides the loop itself, other installations in connection with the project include a check valve and a meter and regular station.

Pipe-Line Personalities

T. A. VAN GRIETHUYSEN, assistant manager of the pipe-line department, in charge of oil trading, Continental Oil Co., was born at Perkins, Okla. He attended grade and high schools at Perkins and was graduated from the University of Oklahoma.

He joined Continental in 1929 and consecutively held positions in the general accounting, personnel and real estate divisions.

In 1935 he was transferred to the production and drilling department, and in 1939 was made superintendent of the oil trading division. He was promoted to be assistant manager of the pipe-line department in charge of oil trading, effective May 1.

T. A. VAN GRIETHUYSEN

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Pipe Lines With
PRICE-WELDED Joints
"The Modern Method"

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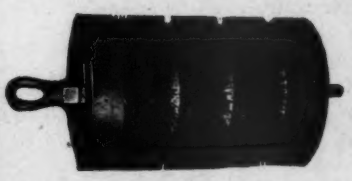

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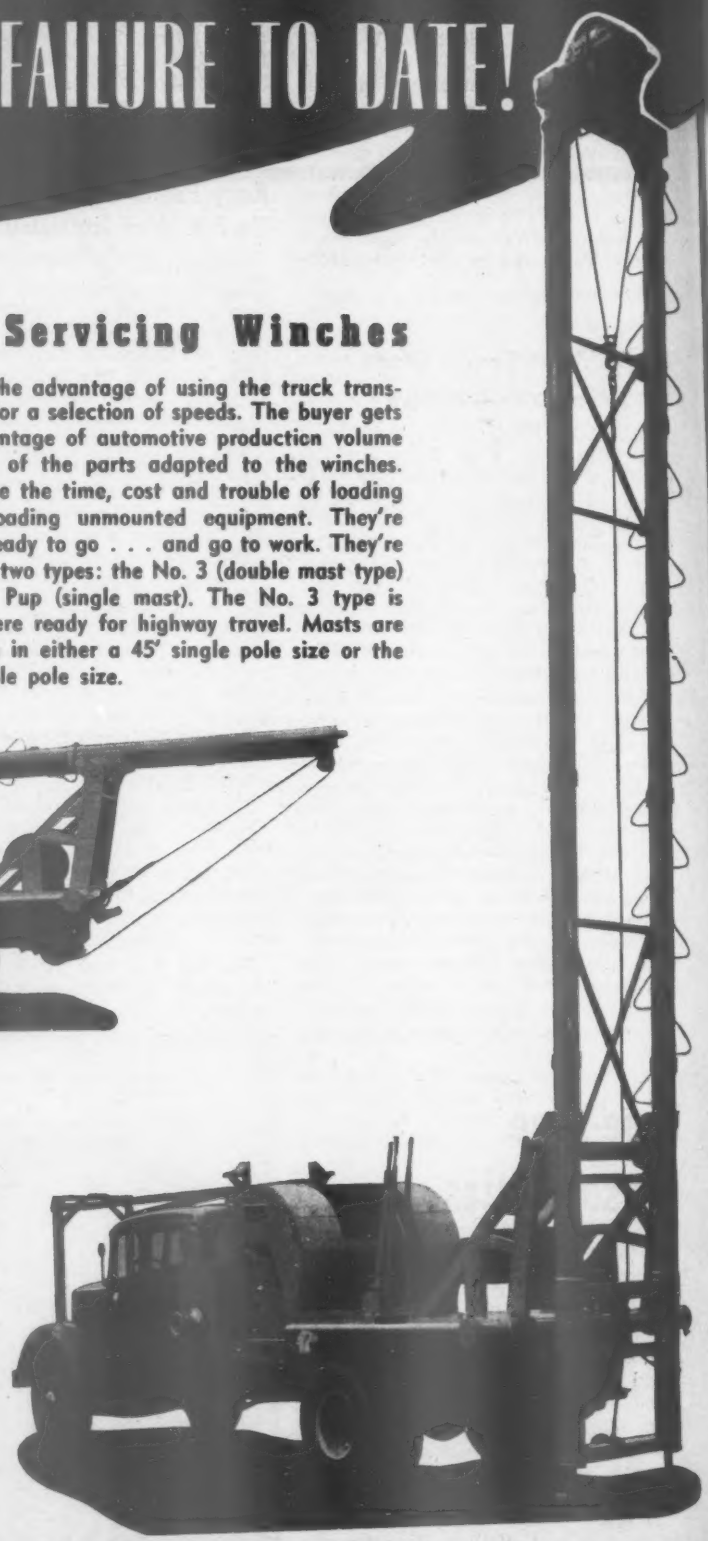

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Natural Gas

New 20-In. Line Will Relieve Appalachian Gas Shortage

WASHINGTON, D. C. — Federal Power Commission has granted East Ohio Co. authority to construct and operate a 20-in. gas line extending 120 miles in an easterly direction from an interconnection with Panhandle Eastern Pipe Line Co.'s facilities at Maumee, Ohio, to East Ohio's Brush Farm station between Akron and Cleveland, Ohio. Estimated cost of the project, designed to relieve the gas shortage in the Appalachian area, is $2,868,061.

Natural gas produced in the Amarillo field, Texas, and the Hugoton field, Kansas and Oklahoma, will be transported by Panhandle Eastern through Missouri, Illinois and Indiana, into Ohio to the Maumee interconnection. From that point, the gas will be transported by East Ohio through the new pipe line to Brush Farm valve station and thence through existing pipe lines to local distribution plants.

The War Production Board advised the commission that "additional supplies of gas must be provided promptly in the northwestern Appalachian area, consisting of eastern Ohio, northern Pennsylvania and western New York. It also appears, from the evidence, that the shortage in the Appalachian area is not merely related to the war period, but that when the war emergency is over the declining gas reserves in this region will be incapable of meeting requirements."

Some 68 communities, including Cleveland, Akron, Canton, Massillon, and Youngstown, Ohio, are served through eastern Ohio's local distribution systems.

Panola Gas Search Likely To Go South and Southeast

CARTHAGE, Tex.—Search for additional gas reserves in the Trinity series of Panola County is expected to turn soon to the south and southeast. Thousands of acres already have been opened to production from the Petit lime and Travis Peak sand north and northeast of Carthage. According to reports, Humble Oil & Refining Co. and McAlester Fuel Co. will start operations in the county soon.

Humble was understood to be examining titles on leases south of Carthage in and around the Willis Vaughn and G. Goodwin surveys preparatory to drilling. McAlester was said to be planning a start on its block in and around the W. Anderson Survey.

Most of the play in the county has been north and northeast of Carthage. Rogers Lacy has two tests going now and has plans for six more. Arkansas Louisiana Gas Co. is erecting an absorption-type gasoline plant northeast of Carthage and also plans more drilling. It was reported that Union Producing Co., which finaled a gasser early this year, was considering further development.

Leakage Will Necessitate Rebuilding of Gas Lines

HOUSTON, Tex.—Leakages in distribution lines of the Magnolia gas plant, which is city-owned and operated, will necessitate rebuilding of the lines, an investigation reveals.

Gas losses last month through leakage amounted to 57 per cent of the value of the gas bought in nearby fields, Utilities Director J. M. Nagle reported.

City Manager John N. Edy said he is contemplating expenditure of $40,000 for repairs. The loss last year was 37 per cent for the entire year, involving $22,990 worth of gas.

The loss can be expected to be worse during the winter, since more pressure is necessary because more fuel is being used.

FPC Reduces Job Involved In Filing Gas Contracts

WASHINGTON, D. C. — Federal Power Commission has amended the rules pertaining to the filing of industrial-rate contracts by natural-gas companies, and it is estimated that the commission's action will reduce filing requirements of utilities by two-thirds and at the same time give the commission information on 80 per cent of industrial gas sales. A previous order required natural-gas companies to file copies of contracts for the direct sale of natural gas to industrial consumers where such contracts involved the sale of 5,000 million cu. ft. a year or more. The new order raises the minimum to 100,000 million cu. ft. a year.

Gas Companies File Plans For Merger With SEC

PHILADELPHIA, Pa.—United Gas Corp. and Houston Gas Securities Corp., both of New York, have filed a merger plan with the Securities and Exchange Commission.

The plan involves the merger of Houston into United Gas and assumption by the latter of the obligations of Houston Gas under its $3,900,000 principal amount of 5 per cent collateral trust gold bonds.

Natural Gasoline

Arkansas Louisiana Builds Gasoline Plant for Panola

MARSHALL, Tex.—Arkansas Louisiana Gas Co., subsidiary of Cities Service Oil Co., has begun construction of an absorption-type gasoline plant in Panola County. The plant, about 7 miles northeast of Carthage, is to have an estimated daily capacity of 25,000,000 cu. ft. of gas. The company also has started work on a right of way for 10 miles of 16-in. pipe line from the Bethany area to the new plant.

This plant makes the third for the company in the Marshall area. One is in the Waskom field, Harrison County, and another is in the Rodessa pool, Marion County. Arkansas Louisiana has several producing wells in this territory and is said to contemplate additional drilling.

Isobutane Processed From Turner Valley Natural

CALGARY, Alta.—Isobutane, used in the manufacture of high-test aviation gasoline, is now being processed from Turner Valley natural gasoline. Imperial Oil, Ltd., has posted a price of $2.74 a barrel for isobutane and has announced a new price basis for absorption gasoline. The component parts of absorption gasoline are to be determined as a volume per cent and will be paid for at the following per barrel prices, f.o.b. plant tankage:

Propane, 28 cents; isobutane, $2.74; normal butane, exclusive of that contained in 26 R.v.p. product, 28 cents; 26 R.v.p. product, $2.28. The 26 R.v.p. product will be assumed to be 150 per cent of the pentanes and heavier, i.e., the pentanes and heavier will be determined and to such volume will be added 50 per cent, reducing normal butane by the same amount.

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Exploration and Drilling

Week's Highlights

THE Gebo dome discovery by Continental Oil Co. gives Wyoming another major black oil field. The well, 1 Gebo unit, on the Gebo structure at the south end of the Big Horn basin of northern Wyoming, was classed as a major discovery when it found saturation in the Embar last October. Now as progressive testing of the entire horizon nears completion, it has proven to be as good or better than expected.

The well had previously flowed from the lower section of the pay, the two horizons being tested separately. When the upper section of the Embar was tried the past week, it averaged 90 bbl. of oil an hour for 5 hours, through a 3/4-in. choke on tubing and then was pinched in for 500 bbl. a day. No attempt was made to establish a potential but officials estimated that it could easily have been made to flow as high as 200 bbl. an hour. This test was in 107 ft. of fully saturated Embar topped at 4,735 ft. and was exclusive of the lower zone in the same formation which was shut off while it was being made.

The lower zone, separated from the upper by a 15-ft. break, contained some 33 ft. of additional saturation. The well made a flow of 2 bbl. an hour in this section, without an acid treatment and without any attempt to force it up to a maximum.

These results show the entire Embar section to be fully saturated, free from water and capable of making a big well. The Tensleep, below the Embar, previously had been tested without favorable results. The oil tests 29° A.P.I. scale, corrected, and has less sulfur content than the Elk Basin crude farther to the north. The area has been unitized and comprises approximately 3,600 acres. The known closure of the structure is said to be at least 800 ft. Location of the discovery is in the SW NW SE 23-44n-95w, and it has a ground elevation of 4,735 ft.

Location of this well, on the east flank of the Big Horn basin, has opened a large area for future prospecting, and in an area which was previously more or less disregarded. Operations are expected to get under way for the second well on the adjoining north 40 acres in SW SW NE Section 23.

LOUISIANA GULF COAST: Location has been made for an outpost well in the new Rosedale field of Iberville Parish. Location of the well is 1 1/4 miles west of the discovery and will be carried to 12,000 ft. (p. 88).

SOUTHWEST TEXAS: Wilcox sand production is found on the north flank of the Ray field in northwestern Bee County (p. 91).

EASTERN TEXAS: Skelly Oil Co.'s Paluxy sand discovery has found another pay zone. A good show of high-gravity green oil was recovered at a lower depth (p. 88).

PERMIAN BASIN: Three wildcats, one each in Cochran, Crane and Pecos counties, were showing for pool openers last week. In Winkler County, a second test, 1 mile northwest of the Key-Allen discovery was running high on the Montoya zone (p. 93).

CANADA: With an estimated potential of 75 to 100 bbl. after partial acidizing of the lower lime at 5,062-80 ft., Pacific Oil & Refining Co.'s well in the Del Bonita area of southern Alberta is regarded as a likely northern extension of the North Cut Bank field of Montana (p. 92).

COMPLETIONS IN ALL FIELDS . . .

(Week ended December 11, 1943)

	Oil	Gas	Dry	Total	Footage	Total Comp. to date 1943	1942
N. Y., Penna., W. Va.	48	18	0	66	116,925	3,269	3,276
Ohio	3	13	8	24	69,312	892	1,075
Indiana	0	0	1	1	2,945	205	315
Kentucky	5	5	13	23	44,383	458	188
Illinois	34	0	17	51	138,090	1,682	1,736
Michigan	2	2	5	9	15,864	600	643
Kansas	10	1	22	33	116,757	1,599	1,457
Nebraska	0	0	0	0	0	27	33
Missouri-Iowa	0	0	1	1	2,188	18	13
Oklahoma	11	3	13	27	92,441	1,135	1,119
Texas:							
North Central Texas	17	0	18	35	113,791	1,417	888
West Texas	19	0	7	26	102,896	884	1,229
Texas Panhandle	3	0	0	3	9,542	176	313
Eastern Texas	6	0	8	14	77,756	296	382
Texas Gulf Coast	4	0	6	10	72,276	450	647
Southwest Texas	19	5	16	40	241,554	892	873
Total Texas	68	5	55	128	617,815	4,115	4,532
North Louisiana	6	2	1	9	30,424	318	460
Louisiana Gulf Coast	8	0	2	10	90,568	343	424
Total Louisiana	14	2	3	19	120,992	661	884
Arkansas	5	0	1	6	23,369	258	171
Mississippi and Southeast	1	0	3	4	29,147	99	63
Montana	5	0	1	6	13,550	226	194
Wyoming	0	0	1	1	900	127	108
Colorado, Utah	1	0	4	5	7,217	28	24
New Mexico	8	0	3	11	26,334	226	220
California	31	1	10	42	169,871	1,308	743
Total United States	246	50	161	457	1,608,120	10,944	10,792
Total previous week	213	49	106	388			
Week ending Dec. 12, 1942	166	40	101	307			

LOUISIANA GULF

Southwestern Oil & Refining To Drill Rosedale Test

NEW ORLEANS, La.—A new location, expected for weeks, in the Rosedale field area of Iberville Parish, is Southwestern Oil & Refining Co. 1 Schwing, in 62-7s-9e, to be drilled to 12,000 ft. This is about 1¼ miles west of the discovery well. The area, opened last October by Sugarfield Oil Co. 1 Iberville Mortgage & Loan Co. (originally drilled by Humble Oil & Refining Co. and abandoned at 10,025 ft.) is considered one of the major 1943 discoveries in the Louisiana Coast territory. The discovery flowed 210 bbl. of 34.6-gravity oil a day on 7/64-in. choke from perforations at 10,009-12 ft., with tubing pressure of 1,625 lb., casing pressure of 1,700 lb., gas-oil ratio 400 and no water.

Amerada Petroleum Corp. continues to test 1 Bertinot-Quebedeaux Unit, prospective discovery well in the Arnuadville area of St. Martin Parish, but it was still showing some water in perforations at 10,349-78 ft. One gage was 35 bbl. in 23½ hours through 5/32-in. choke, with tubing pressure of 4,700 lb. and high gas-oil ratio. A previous test, in perforations at 10,386-90 ft., flowed a small quantity of oil with salt water. Total depth is 10,700 ft. with 5½-in. casing set at 10,445 ft.

Pure Oil Co. 14 Alliance Trust, southwest extension well at Southwest Gueydan field in Vermilion Parish, 33-11s-1w, was completed flowing 244 bbl. of 35.7-gravity oil daily through 9/64-in. choke and 300,000 cu. ft. of gas, with tubing pressure of 1,675 lb., casing sealed. Total depth is 10,075 ft., with 5½-in. set on bottom and perforated at 9,708-22 ft. and 9,730-46 ft. for the completion.

LOUISIANA GULF COAST WILDCAT COMPLETION

Acadia Parish: Sun and Continental 2 Homeseekers Development Co., 54-10s-1w,, at Estherwood, dry at 11,962 ft.

EASTERN TEXAS

Smith County Wildcat Shows Oil From Rodessa Section

DALLAS, Tex.—Skelly Oil Co. 1 Chisum, T. Hawkins Survey, Sand Flat area wildcat, which already had assured production from the Paluxy, had a showing of live green oil on the pit after penetrating the anhydrite section, threatening to blow out in drilling from 9,060-69 ft. The test had a base of Massive anhydrite at 9,040-50 ft., and the showing occurred just below this depth, probably in the Rodessa section. The showing of oil was estimated to be about 47 gravity. Production from the Paluxy sand, topped at 6,945 ft., had been assured when oil of 24.6 gravity rose 6,000 ft. on drill-stem test from 6,972 to 7,007 ft.

Wood County.—Wood continues to be the most active county in the East Texas district. Three new wildcats were announced last week, one of which will be a Travis Peak lime test. It is Magnolia Petroleum Co. 1 Katie M. Lindley, in the Sarah McDonald Survey, near Yantis. Hunt Oil Co. 1 J. W. Kennedy, 1 mile southeast of the Quitman pool, and separated from it by a dry hole, will be a Paluxy test. Roeser & Pendleton 1 Dabney White, 1¼ miles west of Mineola, will be another Paluxy test.

Van Zandt County.—Delta Drilling Co. 1 Gibson-Echols, Walker Survey, 3 miles northwest of Grand Saline, Travis Peak test, had a show of black oil from 7,350-60 ft., from gray lime topped at 7,340 ft., and was drilling ahead below 7,590 ft.

EAST TEXAS WILDCAT COMPLETIONS

Henderson County: B. F. Phillips 1 Welsh, 467 ft. from S, 934 ft. from W, 138-ac. tract, Isaac Greeson Sur., elev. 284 ft., dry at 4,107 ft.

Houston County: Fox & Butler 1 Craddock, 330 ft. from N and W, 80-ac. tract, J. R. Hart Sur., elev. 338 ft., dry at 3,056 ft.

Van Zandt County: Bronstein & Seigel 1 F. L. Loftin, 660 ft. from SE and SW, 160-ac. tract, 2,610 ft. from SW, 7,100 ft. from SE Robt. Giles Sur., elev. 464 ft., dry at 4,828 ft.

TEXAS GULF COAST

Extension of Stowell Field Is Promised by Gulf Test

HOUSTON, Tex.—Interest of Gulf Coast operators centered this week on Gulf Corp.'s 1 Horace Williams, Lot 85, Koch Subdivision, F. Valmore Survey, about 4,500 ft. northwest of production at Stowell field. With total depth of 7,841 ft., 5½-in. casing was set at 7,768 ft. The well was cleaning from perforations at 7,640-60 ft., and 7,590-7,610 ft. through 9/32-in. choke on the top sand and ¼-in. on the bottom sand. No gauge was available but pressures are reported low. A commercial producer here, besides extending the field almost ¾ mile, would open first production on the Chambers County side of the line, the field heretofore lying completely in Jefferson County.

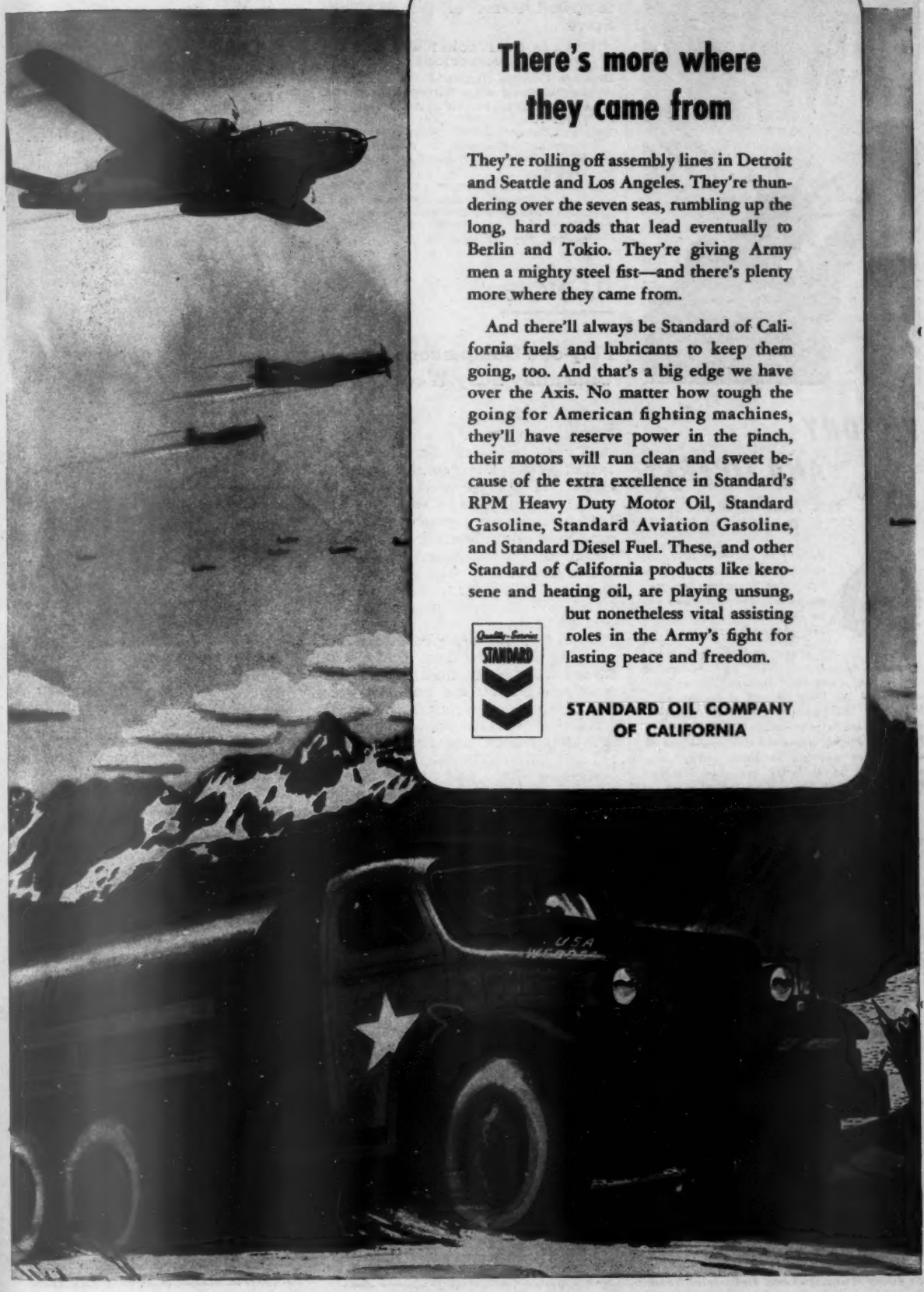
Pan American Production Co. 1 Austin College, in William C. Harvey Survey, out on the southwest flank of Raccoon Bend field, Austin County, flowed gas and salt water from perforations at 7,300-12 ft. and 7,318-28 ft. in the two top Wilcox sands. Operator was doing some cementing in an effort to shut off water to complete as a gas well. Total depth is 9.515 ft. with 5½-in. casing set at 7,685 ft. Previous tests, in deeper Wilcox sands, yielded salt water. The Wilcox was topped at 7,300 ft.

Shell Oil Co., Inc. announced location for 1 William Holderrith Unit in the Spring Creek area of northern Harris County, with proposed depth of 12,250 ft. This test is on one of the highly regarded, nonproductive Gulf Coast structures, east of the Tomball field. It is 660 ft. from north and west lines of a 40-acre unit, in George Galbraith Survey A-22, about

DAILY AVERAGE PRODUCTION FOR WEEK

	Dec. 11 crude oil	Distillate, allied products	Dec. PAW quota all oils	Dec. 4 crude oil
Arkansas	79,860	4,800	81,700	79,400
California	780,300	47,500	855,500	780,250
Colorado	7,120	.....	7,000	7,350
Eastern fields	70,150	8,900	85,900	69,875
Illinois	221,850	12,700	227,700	218,150
Indiana	12,775	.....	14,400	13,525
Kansas	273,500	6,100	291,100	267,100
Kentucky	23,960	3,000	28,500	24,600
Louisiana	354,120	22,000	375,700	352,800
North Louisiana	78,620	.....	.....	78,700
Louisiana Gulf	275,500	.....	.....	274,100
Michigan	52,900	100	57,100	60,100
Mississippi	47,220	.....	48,000	49,650
Montana	23,265	300	23,800	24,520
Nebraska	1,700	.....	1,500	1,725
New Mexico	112,550	6,000	116,600	112,550
Oklahoma	335,150	26,000	358,000	322,600
Texas	1,882,900	126,000	2,018,000	1,906,200
East Texas	364,300	.....	.....	369,500
West Texas	354,400	.....	.....	356,950
North Central Texas	143,400	.....	.....	143,200
East Central Texas	115,100	.....	.....	133,650
Texas Panhandle	94,400	.....	.....	90,600
Texas Gulf Coast	711,600	.....	.....	714,700
Southwest Texas	99,700	.....	.....	99,600
Wyoming	102,550	3,700	103,700	102,860
Total United States	4,371,870	269,100	4,694,200	4,395,255

Total production January 1-December 11, 1943 ..... 1,414,717,275 bbl.
Same period last year ..... 1,341,515,855 bbl.



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TEXAS GULF COAST WILDCAT COMPLETIONS

Brazoria County: Humble 3 Houston Farms Development Co., Rattlesnake Mound, Alfred Swingle Sur. A-369, dry at 11,700 ft.

Harris County: Cities Service 1 J. A. Sharman, southwest of Bammel field, W. H. Mowery Sur. A-1,419, dry at 7,801 ft.

Wharton County: Humble 1-B Donald and F. B. Duncan, Hungerford area, Alex Edgar Sur. A-93, dry at 7,560 ft.

Shell 1 H. P. Stockton, ¼ mi. NW of Louise, dry at 5,880 ft.

ILLINOIS

Fifty-one Completions in Unusually Busy Week

CENTRALIA, Ill. — Fifty-one wells were completed in Illinois in the past week in review. Initial production of 3,778 bbl. represented an average of 111 bbl. per well. The 34 oil wells ranged from 6 bbl. to 776 bbl. in first-day production. Forty-nine new operations were started of which eight were wildcats.

The largest new well of the week was Pure Oil Co.'s 1 R. S. Schott, C NE SW 30-3n-9e, in the Schnell pool in Richland County. It swabbed 776 bbl. per day after an acid treatment in McClosky lime at 2,996-97 ft. and 3,034-35 ft., total depth 3,062 ft. When put on the pump it produced 619 bbl. the first 24 hours.

Another well far above the average of the week was Eason Oil Co. 1 J. T. Henry, 13-2s-4e, in the North Markham City pool in Jefferson County, which pumped 457 bbl. in 24 hours, following acid treatment of McClosky lime at 3,058-62 ft., and 3,069-82 ft., total depth 3,087 ft.

Excluding the above two wells, the remaining 32 new wells averaged only 80 bbl. per well in initial oil output.

New wildcat operations started during the week included F. Mitchell 1 H. Weir, SW NE NE 12-9n-13w, Clark County; Sun Oil Co. 1 R. O. Young, C NE SW 7-6n-4w, Bond County; George & Wrather 1 Elbert, NE SE NW 26-4n-12w, Lawrence County; Wiser Oil Co. 1 Wells, 370 ft. from north and 330 ft. from west lines SW NW 29-2n-9e, Clay County; Kingwood Oil Co. 1 Burkett, SW SW NW 26-1n-5e, Wayne County; Kiowa Drilling Co. Smith-Webb Community, 558 ft. from south and west lines SW SE 20-2s-4e, Jefferson County; E. P. Jarvis 1 R. Davis, C NE SW 1-8s-8e, Gallatin County, and Stanolind Oil & Gas Co. 1 Seifert-Fisher, C W½ SW NW 35-2s-9e, Wayne County.

ILLINOIS WILDCAT COMPLETIONS

Clark County: Gallatin & Phillips 1 Blakeman, SW NE NE 13-9n-14w, Penn sand at 335-45 ft., 365-75 ft. and 405-38 ft., T.D. 438 ft., shot, pumped 15 bbl. of oil.

Crawford County: Joe Dawson et al 1 George, NW NE NE 18-8n-13w, dry at 1,285 ft., Penn sand 1,188-92 ft., Ste. Genevieve lime top 1,217 ft.

William H. Krohn 1 Alice Boyer, SW NE NW 11-8n-12w, dry at 2,899 ft., Devonian lime top 2,761 ft.

Effingham County: A. J. Hanner 1 Ruskin, SE NE SE 4-7n-6e, dry at 2,550 ft., lower Glen Dean 2,021 ft., Cypress 2,191 ft., Benoist 2,350 ft., Aux Vases 2,409 ft., McClosky 2,497 ft.

Fayette County: Paul Doran 1 Mabry-White, NE NW NE 9-6n-1e, dry at 1,818 ft., Waltersburg 1,140 ft., Cypress 1,548 ft., Benoist 1,606 ft., Aux Vases 1,627 ft., McClosky 1,732 ft., St. Louis 1,805 ft.

Jefferson County: J. W. Murchison 1-A Sledge, SE SE SE 34-3s-2e, Rosiclare lime 2,766 ft., sand 2,791-2,805 ft., T.D. 2,805 ft., shot, pumped 33 bbl. of oil.

Wayne County: Comanche Petroleum 1 Felix Bros., C SE SE 2-2s-6e, dry at 3,403 ft., Menard 2,445 ft., Aux Vases 3,194 ft., McClosky 3,315-19 and 3,327-35 ft.

Robinson & Puckett 1 Gordon 1 Muhlbach, C SE NE 1-1n-8e, Rosiclare lime 3,085 ft., T.D. 3,128 ft., acidized, pumped 127 bbl. of oil.

MICHIGAN

Fewer Wildcats Reflected In Low Crude Prices

SAGINAW, Mich. — With Michigan operators and state officials joining in the agitation for crude-oil price increases, field activities have begun to reflect discouragement over the price situation as regards wildcatting. Winter's approach also is having its effect. As a result there were but eight completions last week, resulting in two oil wells, two gas wells, including a discovery well, and five dry holes.

Arcada Township (11n-3w) of Gratiot County is the location of the gas well, the C. E. Weller-T. F. Caldwell, Inc. 1 James Davidson, in Section 36. It was capped after gaging about 17,000,000 cu. ft. a day. Negotiations were reported under way to market the well through Consumers Power Co., which has a gas line running nearby and the operators were moving in equipment to resume oil testing in the township in an area about 10 miles from other production. The gas was tapped at 908 ft. The dry holes included two other wildcat tests in Garfield Township, Bay County, and Holland of Ottawa, and in the Adams-Arenac area Ervin Major 1 Hull was dry at 4,350 ft.

MICHIGAN WILDCAT COMPLETIONS

Bay County, Garfield Township: Freeman Oil Co. et al 1 Kalinowski & Pelkey, C S½ SW SW 9-16n-3e, dry in Dundee at 3,505 ft.

Gratiot County, Arcada Township: C. E. Weller-T. F. Caldwell, Inc. 1 James Davidson, C N½ NW SW 36-11n-3w, natural-gas well, 16,600,000 cu. ft, T.D. 908 ft.

Ottawa County, Holland Township: E. L. Bourret 1 Leon and Ruth Klein, SE NE NW 26-5n-15w, dry at 1,536 ft.

SOUTHWEST TEXAS

Wilcox Production Found on North Flank of Ray Field

CORPUS CHRISTI, Tex.—H. B. Zachry Co. 1 Phil L. Campbell has opened Wilcox-sand production on the north flank of the old shallow Ray field in northwestern Bee County, 3 miles southeast of Mineral, Brooks & Burleson Survey 1. It flowed gas and condensate on drill-stem test through perforations at 7,766-70 ft. with 1,925 lb. working pressure. Preparations were being made to complete at total depth of 7,787 ft., with 5½-in. casing set at total depth and top of pay sand at 7,766 ft. This apparently is in the Luling, or second Carrizo, as the first Carrizo was logged from 7,569-7,601 ft. This well showed gas condensate at 7,573-93 ft., with some oil on a test at 7,593 to 7,601 ft.

An east extension to the Mineral field, Bee County, Cities Service Oil Co. 1 Bast et al, Thomas K. Pilkington Survey, flowed about 4 bbl. an hour of 56.7 gravity amber condensate and 1,000,000 cu. ft. of gas per day while cleaning from perforations at 7,430-45 ft. It is producing from the Slick (first Carrizo) sand, topped at 7,430 ft., the discovery horizon. Total depth is 7,637 ft.

Republic Natural Gas Co. 1 John Hancock Mutual Life Insurance Co., about 1 mile west of the Taft field, San Patricio County, T. T. Williamson Survey, flowed pipe-line oil at the rate of 100 bbl. daily on 5/64-in. choke with tubing pressure at 420 lb., casing pressure at 700 lb., from perforations at 4,913-16 ft. in the field pay zone. Total depth is 4,936 ft., with 5½-in. casing set at 4,939 ft. This is a major extension to the field and opens considerable new territory to development.

A new oil field has been opened by Fred W. Shield's 1 Etta Terrell, southeast of Fannin townsite, in Antonio Siedeck Survey, Goliad County. Total depth is 5,203 ft., with 5½-in. casing set at 4,850 ft. The well, cleaned at the rate of 5 bbl. of 23.9-gravity oil (corrected) per hour through ⅛-in. choke with tubing pressure of 750 lb. and casing pressure 1,675 lb. It was shut in for storage. Perforations are at 4,650-66 ft.

A major discovery seems probable in Brooks County, where Humble Oil & Refining Co. 1 Scott & Hopper, A.C.H.&B. Survey 107, 4 miles northeast of the Alta Mesa field, continues to test. Two good oil sands and two good condensate sands have been reported. The best sand was logged at 6,539-57 ft. the well flowing gas condensate here on drill-stem test, the second test recovering 44-gravity oil. The upper sand, in top of the Vicksburg, was at 6,311-14 ft. and showed gas condensate on test.

LOWER GULF COAST WILDCAT COMPLETIONS

Goliad County: Frank and George Frankel 1 O. A. Schroete, in E cor. of Louis von Roeder Sur., new pay discovery well at Slick-Wilcox field, 97.38 bbl. through 3/16-in. choke, perf. 35/7,658-63 ft., G.O.R. 1,843 ft., T.P. 525 lb., T.D. 9,007 ft.

Jim Wells County: Bay-Tex Oil Co. 1 Henry Knolle, Blk. 8, J. H. Gallagher subd., Casa Blanca grant, 3½ mi. SE of Sandia, dry at 6,006 ft.

Butcher-Arthur, Inc. 1 Rowena Schaeffer, in John T. Porter Sur., 15 mi. NW of Alfred, dry at 6,028 ft.

Edwin M. Jones 3 M. A. Evetts, Roberts & White subd. of McIntyre tr., Marcelino Lopez "Los Presenos" Gr. A-281, new pay discovery at North Magnolia City field, 234.12 bbl. through 9/64-in. choke, perf. 5,047-50 ft., T.P. 825 lb., C.P. 980 lb., gas-oil ratio 400, T.D. 5,516 ft., P.B. 5,050 ft.

Sun Oil Co. 16 J. W. Miller, Sec. 66, R. P. Haldeman subd., Seelingson ranch, new pay discovery at Seelingson, dual oil-gas completion; zone 12 (new sand) top sand 4,758 ft., perf. 4,758-64 ft., est. 18,500,000 cu. ft. gas open flow, S.I.P. 1,975 lb.; zone 20, top sand 6,115 ft., perf. 6,120-28 ft., 124.05 bbl. through 9/64-in. choke, C.P. 750 lb., T.D. 6,152 ft.

Refugio County: Pat R. Rutherford 1 Joe Weiss, Johnson & Pugh subd. of Bonnie View ranch, G. C. Cobian and Esteban Lopes Sur., 1¾ mi. N NE of La-Rosa field, discovery well (area not yet named), 90.75 bbl. through ¼-in. choke, perf. 6,185-87 ft., T.P. 2,200 lb.,

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C.P. 2,310 lb., gas-oil ratio 39,000, T.D. 6,503 ft.

Southern Minerals Corp. 2 R. H. Wood et al, in Anastacio Reojas Grant, 2,387 ft. SW of 1 Wood discovery well at Woodsboro field, old well worked over, opens two new gas pays, dual completion 10-20-43; upper sand perf. 3,113-18 ft., 180,000,000 cu. ft. gas open flow, 1,350 lb. rock pressure; lower sand perf. 3,491-96 ft., 3,200,000 cu. ft. gas, open flow, 1,350 lb. rock pressure, T.D. 6,007 ft., P.B. 3,510 ft.

San Patricio County: Henshaw Bros. and Coastal Refineries 1 L. Horn, Cubage & Miller subd., J. de la Garza Grant, 1½ mi. SE of Edroy, dry at 6,010 ft.

Victoria County: Barnsdall et al J. N. Mitchell, in Placedo Benavides Grant A-124, 2 mi. S of Keeran field, dry (junked) at 6,880 ft.

SOUTH CENTRAL TEXAS WILDCAT COMPLETIONS

McMullen County: Quintana and Humble 1 Mable Lowe Grimes, in William Hermitage Sur. 10, A-1,076, 12 miles SE of Fowlerton, dry at 7,525 ft.

Wilson County: Stanolind 1 A. F. Rotter, Luis Manchaca grant, 1½ mi. N of Poth, dry at 4,250 ft.

SOUTH TEXAS WILDCAT COMPLETIONS

Brooks County: Sun and Humble 1 Mary M. Lasater, in H.E.&W.T Sur. 349, 6 mi. SE of Falfurrias, on Gyp Hill prospect, dry at 923 ft. (hit cavity and junked hole.)

Duval County: Sun 2 E. G. Barton et al, Robert Fletcher Sur. 6, A-215, 1¼ mi. NE of Benavides field, dry at 5,996 ft.

Taylor Refing Co. 3 P. G. de Garcia, in Blackstone-Hardeman Sur. A-288, about ¼ mi. SE of company's 1-C de Garcia (4,800-ft. sand discovery well), 105 bbl. through 5/32-in. choke, perf. 4,274-79 ft., comp. 11-6-43, T.P. 85 lb., C.P. 750 lb., gas-oil ratio 425, T.D. 5,169 ft.

Starr County: Sun Oil Co. 1-B D. D. Oil Co., B.S.&F. Sur. 77, about 1 mi. NE of Cameron field discovery well, dry at 5,421 ft.

Zapata County: George H. Echols 1 Volpe est., Porc. 32, Mateo Pena Sur., 8 mi. E. of Zapata townsite, dry at 7,014 ft.

CANADIAN FIELDS

North Cut Bank Field May Be Carried Into Alberta

CHATHAM, Ont. — Possibility of an important northerly extension into Alberta of the North Cut Bank field of Montana is indicated in the Del Bonita-Twin River area, where Pacific Oil & Refining 1, LSD 12, 18-1-21w4, finished in Madison limestone at 5,080 ft., is reported a 75 to 100-bbl. producer. After acidizing the lower lime with 850 gal. the well for a short time flowed by heads, but the gas failed to hold up. Swabbing disclosed a 2,000-ft. column of water-free crude in casing and tubing, and after 24 hours failed to lower the column. A small section of the upper zone has been gun-perforated and acidized, following which the lower lime is receiving a second acid treatment. Main production is expected from the upper zone. The crude is a green 36.8-gravity paraffin-base product, free from sulfur.

Northwest Turner Valley. — In the Northwest Turner Valley extension, Imperial-Hudson's Bay 14, LSD 13, 8-21-3w5, finished at 8,801 ft. with Madison limestone at 8,202 ft., developed initial production of 763 bbl. daily. It may open a new area for development.

Ram River.—Ram River Oils is preparing for additional development on the Ram River-Clearwater structure, in the Alberta foothills west of Rocky Mountain House. Truck road to the field has been completed, and Ram River 3 will be started early next year, on a location higher on structure than No. 2 discovery well.

Lake Erie well. — On the Ontario fields, West Petroleum 1, drilled in the bed of Lake Erie opposite Port Alma in Romney Township, Kent County, finished in the Guelph-Niagara formation at 1,285 ft. with a shot production of 630,000 ft. a day. Location was made experimentally 5,950 ft. offshore, nearly a mile beyond the earlier inshore lake wells. With the test halted short of the usual depth owing to unfavorable weather conditions, the well was considerably larger than the inshore wells, and will result in systematic drilling of the lake bed for gas.

Saskatchewan. — In South Central Saskatchewan, Simpson Oil 3, LSD 7,

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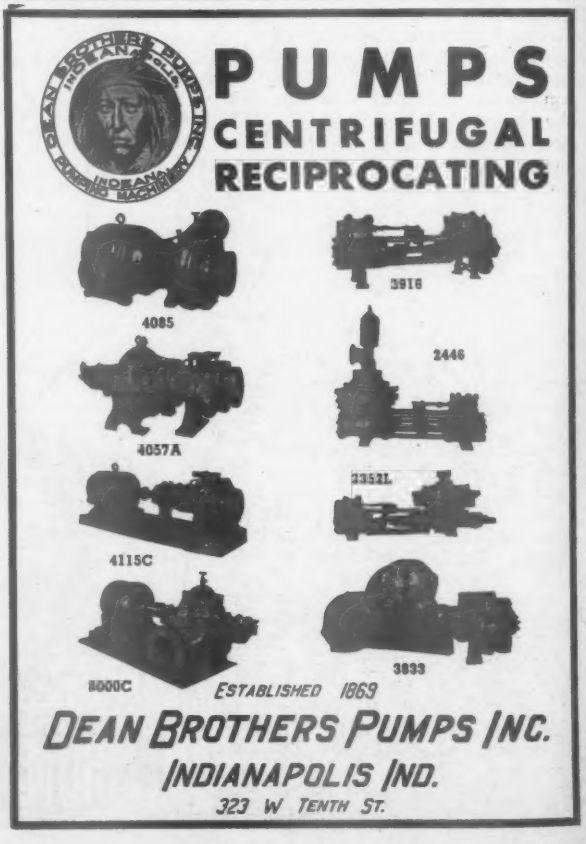


22-23-25w2, has encountered a strong gas flow with 259 lb. pressure at 600 ft., and is making water shutoff to deepen for oil.

PERMIAN BASIN

Three West Texas Wildcats Point to New Oil Pools

MIDLAND, Tex.—Three wildcats in West Texas were showing for new pool openers. In Cochran County, 2 miles northeast of the Sunray-Wright pool and 1 mile southwest of Whiteface, E. Constantin et al 1 G. W. Moore, Labor 9, League 64, Midland County School Land, had swabbed 4 bbl. per hour after acidizing with 3,000 gal. through perforations at 4,867-82 ft. The new well is bottomed at 4,953 ft., plugged back to 4,884 ft., with 5½-in. casing cemented at 4,915 ft. The pay zone compares with that in the Sunray-Wright pool, and the new strike probably will prove to be an extension of the vast producing area of Slaughter-Dean and Sunray pools, already next to the largest in the world, second only to East Texas.

Crane County. — John I. Moore 1 T. C. Barnsley, NE NE Section 42, Block 32, Public School Land, south of Sand Hills pool, was showing oil on pits, and took a drill-stem test at 4,457-4,651 ft., open 75 minutes, recovering 180 ft. of oil-cut mud. The test is 1¼ miles southeast of the nearest producer.

Pecos County. — Four miles southwest of the Abell pool, Globe Oil & Refining and Forest Development 1 Golden estate, south corner of Section 41, Block 10, H.&G.N. Survey, topped the Simpson sand at 5,145 ft. and cored from 5,263-78 ft., recovering 13 ft. of sand, the top 8 ft. of which was hard and dry, the next 4 ft. soft oil sand, and the last 1 ft. hard. Another core from 5,278-93 ft. showed 4 ft. of soft and saturated sand and 11 ft. of shale and sandy shale, with no shows. A drill-stem test from 5,257-93 ft. showed 210 ft. of gas-cut mud, the last 90 ft. being cut with oil. The test is drilling ahead, testing the lower part of the section.

Winkler County. — Sinclair Prairie Oil Co. 4 J. B. Walton, SE SE Section 20, Block 77, Public School Land, 1 mile northwest of the Key-Allen discovery, was calculated to be running 40 ft. higher than the discovery well on top of the Montoya, picked at 7,750 ft., minus datum 4,781 ft. This well already had attracted attention by showing oil in both the Holt zone of the Clear Fork, lower Permian, lime, and an undetermined zone at 7,268-88 ft.

Andrews County.—The second well for the Union pool, 5 miles northwest of the Fullerton pool, was being completed from the Clear Fork pay. Union Oil 2 Biles, north offset to the discovery, had broken pay from 7,080-7,454 ft. and was running drill-stem test.

WEST TEXAS WILDCAT COMPLETIONS

Andrews County: Skelly 1-M University, NW NE Sec. 28, Blk. 1, University Sur., 5½ mi. E of Clabberhill pool, elev. 3,139 ft., dry, Yates 3,070 ft., brown lime 4,240 ft., solid lime 4,570 ft., black shale 6,505 ft., show gas 7,610 ft., T.D. 8,437 ft.

Parmer County: Stanolind 1 A. J. Jarrell, NW NE Sec. 19, Blk. 8, Capitol Lands, 4½ mi. NW Bovina, lime 4,905 ft., dry at 8,162 ft. in granite.

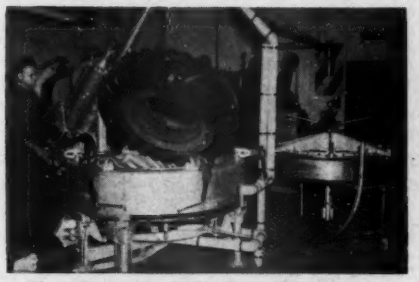
Pecos County: Magnolia 1 Robertson-State, SE SW Sec. 2, Blk. 142, T.&St.L. Sur., elev. 2,794 ft., dry at 6,830 ft.

Crockett County: Duquesne Oil 1 J. M. Shannon, NW NW Sec. 11, Blk. BB, E.L.&R.R. Sur., elev. 2,703 ft., lime 2,450 ft., S.S.O. 2,560-64 ft., dry at 2,701 ft.

SOUTHEAST NEW MEXICO

HOBBS, N. M—Two good completions for the east part of the Maljamar field added 1,000 bbl. per day to the potential of the field. The wells were Barney Cockburn 1 and 3 Shell-State, in SW 29-17s-33e, both of which were good for better than 500 bbl. per day from lime pay below 4,200 ft. The second well for the shallow pay of the Grayburg-Jackson pool was completed for 100 bbl. per day. It is Fren Oil 2 Friess, SE SW 19-17s-32e, which had the pay from 1,903-2,202 ft., total depth.

VITAL....



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ROCKY MOUNTAIN

Weston County Wildcat Has Show of Oil and Gas

DENVER, Colo.—Operators in the Osage stripper field, northeastern Wyoming, where no wells are drilling and none in prospect on account of low price of crude, are anxiously watching a wildcat 15 miles to the southeast which has a show of oil and gas coming up through a hole full of water with indications that it may open a new pool. The well is Western Oil Trust 1, NW SE 24-44n-62w, which was spudded in 1938 as a test to the Muddy sand and which has been drilling intermittently ever since. It topped a sand at 3,852 ft. and the oil and gas began showing through the water. The water is coming from an 8-ft. sand topped at 3,800 ft. Following the showing the 4¾-in. was run and cemented to dry up the hole and make a test. The driller identifies the horizon as a lower streak of the Muddy sand. The unusual feature is the presence of salt water. A similar condition was found in a well drilled by John Brorphy in 13-44-63, which had the Muddy at 3,120-95 ft., and then ran into a lower sand containing salt water with a show of oil. Another was the Pierre La Fleiche well in 21-46-63.

Wyoming oil royalties down.—The treasurer of Wyoming has received a federal warrant for $872,022.39 from the Treasury Department at Washington in payment for the state's share of royalties and rentals from government land in the fiscal year ending June 30, 1943. This amount compares with $1,003,089.04 for the year ending June 30, 1942, a decrease of $131,066.65.

Little Buffalo Basin discovery completed.—The Tensleep sand discovery at Little Buffalo Basin in Fred Goodstein 1 Pedley-Government, NE NE NW 13-47n-100w, is classed as a completion and rig has been moved away although a pumping test has not yet been completed. The driller estimates the well at 600 bbl. a day on the pump.

Important test at Garland.—Following a recent deal in which Ohio Oil Co. acquired one-half interest in a 7,000-acre block within the closing contour of the Garland dome, Big Horn basin, from the Kinney-Coastal Oil Co., location has been made for 5 Ohio-Kinney-Coastal Unit, NW SW SW 13-56n-98w, 4 miles northwest of the top of the structure, and is starting a Madison test. The agreement for the unitization of Ohio and Kinney-Coastal acreage in that area was approved last November by the Secretary of the Interior. Ohio became the unit operator. The new well is believed to be sufficiently down the flanks to miss the gas cap in the Embar and Tensleep horizons and prove the oil possibilities in those horizons and the Madison. It is ¼ mile northwest of Kinney-Coastal 3 Government, completed in 1937, which flowed 15 bbl. of oil from the Madison along with 5,000,000 cu. ft. of gas from the Tensleep and is believed to have been close to the oil-gas contact.

COLORADO WILDCAT COMPLETION

Alamo-St. Mary's, Huerfano County: S. W. Pressey 1 Pressey, C WL NW SE 3-27n-67w, abandoned at 1,250 ft. in shale.

OHIO, KENTUCKY

Killbuck Townsite Has Third Gas Discovery

ZANESVILLE, Ohio.—A new gas pool was opened by Kemrow Co. in Holmes County, making the third discovery in the township this year. The well is on the M. C. Quillen tract in Section 7, and gaged 1,000,000 cu. ft. with a pressure of 1,090 lb. The East Ohio extended Kemrow's first pool ½ mile to the northwest by a 4,500,-000-cu. ft. well on the S. A. Leckrone tract in Section 14.

The Sandyville field was extended 1 mile to the west by Brendel's Schwarm well in Lot 31, Dover Township, Tuscarawas County. The well gaged 4,250,000 cu. ft. from the Clinton at 4,930-53 ft. and rocked to 1,210 lb.

The West Zanesville area in Falls Township had a gas completion by H. K. Porter on the Dearth tract good for 2,260,000 cu. ft. from the Clinton at 3,496-3,531 ft. The area is proving to be more productive of gas than oil. Eight additional wells are now drilling in the area.

OHIO WILDCAT COMPLETIONS

Coshocton County, Jackson Township: Ohio Fuel 1 David Davis, Sec. 23, Clinton, 3,664-3,714 ft., dry, T.D. 3,812 ft.

Holmes County, Killbuck Township: Kemrow 1 M. C. Quillen, Sec. 7, Clinton, 3,276-96 ft., 1,000,000 cu. ft., T.D. 3,299 ft.

WESTERN KENTUCKY

OWENSBORO, Ky. — Seventeen wells were completed in western Kentucky during the week, but only four were oil wells. One of these was a potentially large producer in Union County, Carter Oil Co. 3 Culver, which is reported good for 80 bbl. per hour on open flow, but which was pinched down to 100 bbl. per day, producing from McClosky lime at 2,554-59 ft., natural flow.

WESTERN KENTUCKY WILDCAT COMPLETIONS

Daviess County: H. H. Vickers and A. J. Slagter 1 V. R. Konsler, 3 mi. E of Utica, dry at 1,510 ft.

Hancock County: Kentucky Natural Gas 1 Anna Conner, dry at 796 ft. Glen Dean 555 ft., Bethel 770-82 ft.

Union County: Sohio Production 1 Roberts, dry at 2,760 ft.

Webster County: Texas 1 Johnnie Graham, 5 mi. W of Dixon, dry at 3,066 ft. Menard 2,097 ft., Cypress 2,615 ft., McClosky 2,884 ft., St. Louis 3,066 ft.

B. B. Hamilton 1 A. V. Vaughan, 3½ mi. W of Clay, dry at 1,375 ft.

EASTERN KENTUCKY

ASHLAND, Ky.—Three better-than-average gas wells were among the completions in eastern Kentucky reported the past week. Kentucky-West Virginia Gas Co. completed a 5,333,-000-cu. ft. gasser in Knott County and a 2,886,000-cu. ft. well, and one good for 1,676,000 cu. ft. in Pike County. Ashland Oil & Refining Co. 2 Brice Northcutt in Menifee County is a 25-bbl. well.

CALIFORNIA

Gas Discovery Completed For Lower Potential

LOS ANGELES, Calif.—General Petroleum's Colusa wildcat, which showed a potential of 7,000,000 cu. ft. of dry gas daily on a formation test at 2,919-40 ft., failed to come up to expectations upon completion a few days ago. This wildcat showed an initial of only 3,200,000 cu. ft. and the only consolation in its completion lies in the possibility that it may be an edge well as it is also characterized by low pressures. Exploratory work in search of commercial accumulations of dry gas usually slows up during the winter season due to bad roads and inclement weather in the central part of the state and for this reason it is questionable whether General Petroleum will undertake any additional work at Colusa in the immediate future.

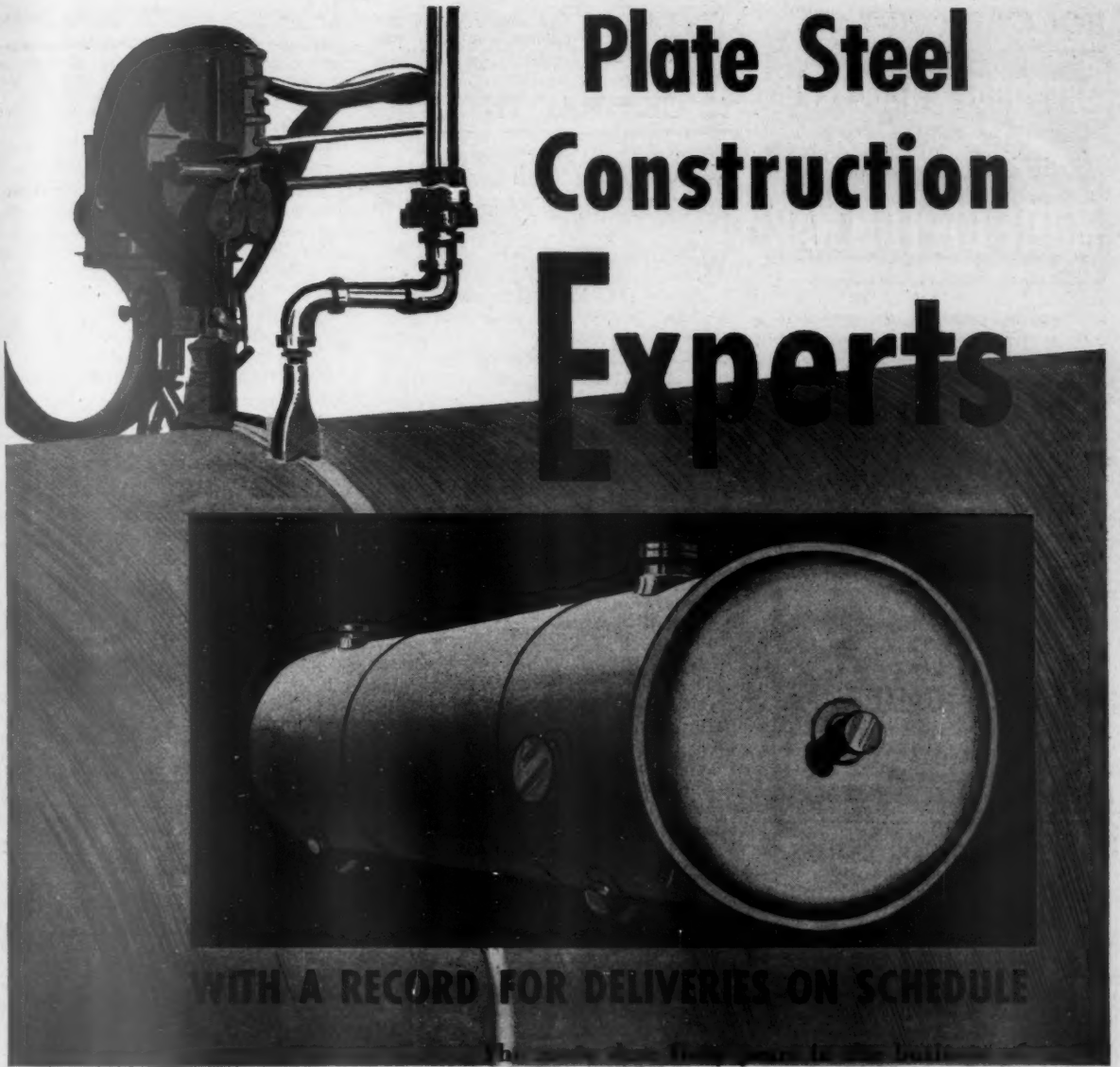
Kern County.—Continental Oil Co. is working on what may prove to be a new discovery between the Strand and Ten Section fields as several thin streaks of oil sand have been cored in the Stevens sand of Miocene age. Continental carried this hole down to 8,495 ft. but has plugged back to get out of a gray sand and shale in the bottom of the hole. The well is 1-H Kern County Land in 18-30s-26e. Stevens oil sand was found first in a core taken at 8,225-42 ft. In the Tejon field, Richfield's second well found the lower Chanac wet and the hole has been plugged back for completion in the upper Chanac from which the discovery well is producing.

CALIFORNIA WILDCAT COMPLETIONS

Costa Mesa wildcat district, Orange County: Lovelady & Frambes 1 Destiny, 9-6s-10w, abandoned in gray sand, T.D. 1,600 ft.

Pleyto wildcat district, Monterey County: Royalty Service Corp. 1 Federal, 21-24s-10w, abandoned in hard brown shale, T.D. 7,676 ft.

Terra Bella wildcat district, Tulare Coun-



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ty: Richfield 1 Hastings, 28-22s-27e, abandoned in basement granite, T.D. 1,731 ft.

N. CENTRAL TEXAS

Canyon Pool Well Completed In Caddo Lime Formation

WICHITA FALLS, Tex.—Deep Oil Development Co. 27 Wilson, Lot 1, Block 119, A.T.N.C.L subdivision, Archer County, was estimated good for 40 to 50 bbl. per day from the Caddo lime after treatment with 4,000 gal. of acid at plugged-back depth of 4,952 ft. The well had swabbed 4 bbl. of oil and 7 bbl. of water with perforations at 4,926-45 ft. and 4,958-78 ft., and treatment with 1,000 gal. of acid. Other wells in the pool are producing from the Canyon lime formation.

Montague County. — Possibility of opening a new field from the Simpson was seen at Gulf Oil Corp. 1 Haggard, Section 2,863, T.E.&L. Survey, southeast of the Owens-Hults pool, which drilled saturated lime from 6,810-16 ft., and cored to 6,830 ft., recovering gray lime with stain and odor of oil. The test was originally contracted to 6,000 ft., to test the conglomerate producing in Owens-Hults pool, but was carried to its present depth when this horizon proved barren. The Simpson was topped at 6,765 ft. The new prospect is 8 miles southwest of the Hildreth pool, which has Simpson production at about 7,200 ft.

NORTH TEXAS WILDCAT COMPLETIONS

Archer County: M. W. Blair Oil Co. 2 Frank J. Henry, 450 ft. from N, 2,840 ft. from E, Lot 35, Blk. 5, Clark & Plumb subd., dry at 1,194 ft.

A. R. Dillard 1-T L. F. Wilson "Luke," 660 ft. from N and E, Sec. 111, A.T.N. C.L. subd., 8 mi. SE Mankins, dry at 5,354 ft.

Clay County: Shell 1 R. F. Wynn, 330 ft. from S and W, 312-ac. tract, Rooney Sur., 3 mi. E Burns-Midway pool, 4½ mi. W Bellevue, flow 1,980 bbl., 48 bbl. water, Mississippi lime pay perf. 6,253-83 ft., acid 5,000 gal. acid, Palo Pinto 2,820 ft., Caddo 5,845 ft., conglomerate 5,974-82 ft., Simpson 6,435 ft., Ellenburger 6,706-95 ft., P.B. to 6,475 ft. from T.D. 6,095 ft. Discovery.

L. T. Burns 1 Jewell Gilbert, 990 ft. from E, 1,650 ft. from S, 227.7-ac. tract, C. F. Bridgeman Sur., 2 mi. SE Joy pool, Caddo 5,537 ft., S.O. 5,555-74 ft., dry at 6,278 ft.

Throckmorton County: Shell 1 Travis County, 7,500 ft. from E, 4,100 ft. from S, Travis County School Land, Caddo 4,730 ft., Ellenburger 5,345 ft., dry at 5,503 ft.

Young County: Belfort Oil and Auto-Ordnance 1 G. R. Whiteley, 467 ft. from N and W, Sec. 414, T.E.&L. Sur., dry at 4,932 ft.

Allen Guiberson 1 H. R. Montgomery, 330 ft. from S and W, Blk. 19, T. H. Smith Sur., 9 mi. SE Graham, S.S.O. 2,660-2,729 ft., dry at 2,739 ft.

WEST CENTRAL TEXAS

ABILENE, Tex.—A shallow Tannehill sand discovery in southern Shackelford County in an area well defined by dry holes was the high light in the West Central Texas district last week. E. H. R. Sabens 1 W. H. Green, Section 68, T.&P. Ry. Survey, pumped 23 bbl. per day from total depth of 973 ft. to give the district its only new discovery. The only wildcat start for the district was O. P. Leonard 1 Snively, SE SE SW, Section 45, T.&P. Ry. Survey, southeast Jones County.

An east offset to the new Hardy pool discovery, completed for 154 bbl. per day from the Canyon sand, was staked as Great Lakes Carbon Co. 1 Ruby E. Nance, in A. C. Michell Survey.

WEST CENTRAL TEXAS WILDCAT COMPLETIONS

Brown County: J. E. Whiteside 1 C. A. Thompson, T. Duckworth Sur., dry at 1,910 ft.

Comanche County: B. F. Collie 3 F. C. Wagnon, 680 ft. from E, 850 ft. from S, 73-ac. tract, Deaf and Dumb Asylum Sur., pump 1¼ bbl., pay 50 ft., T.D. 78 ft.

Haskell County: Humble 1 C. M. Berry, 660 ft. from N and E subd. 2, 5,018 ft. from S of survey, dry at 3,292 ft.

Jones County: Great Lakes Carbon Co. 1 O. H. Hardy, 660 ft. from S and E, Sec. 11, Blk. 4, H.&T.C. Sur., 7 mi. N Anson, elev. 1,616 ft., flow 154.16 bbl. 39.6 gravity, 2 per cent water, Canyon sand pay 3,690-3,706 ft., perf. 3,690-3,706 ft., Palo Pinto 4,225 ft., Strawn 4,500 ft., P.B. to 3,718 ft. from T.D. 4,813 ft. Discovery, Hardy pool.

Shackelford County: E. H. R. Sabens 1 W. H. Green, 220 ft. from E, 500 ft. from S, 68-ac. tract, Sec. 68, Blk. 12, T.&P. Ry. Sur., pump 23 bbl., Tannehill sand pay, T.D. 973 ft. Discovery.

Stephens County: Auto-Ordnance et al 1 Alice Walker, 467 ft. from N, 2,317 ft. from W, Sec. 1310, T.E.&L. Sur., dry at 4,253 ft.

APPALACHIAN FIELDS

Drilling Resumed in Fayette County Deep Gas Test

PITTSBURGH, Pa. — On Chestnut Ridge, in South Union Township, Fayette County, New Penn Development Co., William E. Snee et al have completed cleaning out 1 Heyn and are now drilling at a depth of 7,546 ft. Deepening operations commenced at 7,517 ft.

Maryland.—On the Accident dome, in Garrett County, Maryland, William E. Snee et al have resumed drilling in the wildcat test on the DeLeon T. Rush farm and are now at 5,912 ft.

WEST VIRGINIA

Tucker County.—In Dry Fork district, Tucker County, Ohio Oil Co. has not made any progress in fishing out the tools in the wildcat test on the Kammerling tract.

Wyoming County.—In Center district, Wyoming County, United Producing Co., completed a good gas well in No. 1,119 W. M. Ritter Lumber Co., with gas gaging 2,500,000 after acidizing. The Big Lime was at 2,565 to 3,019 ft., gas at 2,750 ft., T.D. 3,025 ft.

OKLAHOMA

Gulf's Wilcox Discovery Flows 106 Bbl. an Hour

GULF Oil Corp.'s Wilcox discovery in Noble County, which had previously made a number of small heads of oil, was brought in last week at an average flow of 106 bbl. a hour on a 4-hour test. The oil tested 41 gravity and had only a small amount of water. The flow was through casing and at the end of the 4 hours, operators shut it in to run tubing and make connections to the well.

This discovery, 1 Juanita, NE NE NE 1-21n-1e, although not yet completed, was named the West Sumner pool by the Oklahoma Nomenclature Committee. Location is on a geophysical high, just west of the town of Sumner. Nearest Wilcox production are the Liberty and Watchorn pools to the northeast. A number of other wildcat tests were nearing the completion stage and were getting ready to test.

Pottawatomie County. — Stanolind Oil & Gas Co. 1 Rosebush, SW SW SW 19-8n-2e, which has been testing for the past two weeks, swabbed 438 bbl. of oil in 17 hours on the latest test and was shut in for storage. Pay is the second Wilcox at 6,251 ft.

OKLAHOMA WILDCAT COMPLETIONS

Comanche County, Elgin area: Northern Ordnance 1 Coffin, SW NE SW 20-3n-10w, dry, T.D. 1,102 ft.

Muskogee County: Simmons Ray 1 George, SW NW SW 28-14n-18e, dry, T.D. 1,853 ft.

Osage County: Mealy-Wolfe 1 Turner, NW SW SW 32-23n-6e, dry, T.D. 3,423 ft., Bartlesville 2,720 ft., Wilcox 3,112 ft.

Payne County: Skelly 1 Reed, SE SE NW 27-19n-5e, dry, T.D. 3,828 ft., Viola 3,698 ft., Wilcox 3,737 ft., second Wilcox 3,760 ft.

Stephens County: Calapor Mfg. Co. 1-A Howard, SW SW NE 24-2s-8w, dry, T.D. 2,500 ft.

LA.-ARK.

Plugback to Cotton Valley Is 60-Bbl. Well

SHREVEPORT, La.—Hollyfield-McFarlane 1 Rowe, S½ SW SW 16-17s-20w, an old well plugged back to become a second pay discovery, flowed 61 bbl. of oil in 13 hours through 5/64-in. choke. Tubing pressure was 1,550 lb. and gravity of the oil was 41. Perforations were in the Cotton Valley at 5,870-80 ft. Location of the well is in the west end of the Magnolia field.

Union County.—Phillips discovery well east of Rainbow City pumped 238 bbl. in 16.8-gravity oil a day through perforations at 2,770-74 ft. A core at 2,783-93 ft. showed soft porous saturation in a very fine sand. Tops were Travis Peak 2,922 ft., Cotton Valley 3,818 ft., and Smackover at 5,798 ft. Total depth was 5,835 ft.

KANSAS

Several Tests Under Way At Prospective New Pools

A NUMBER of wildcats were in the testing stage last week but no new pools were reported. In Barton County, Winkler-Koch 1 Schauf, N½ SE NW 11-16-12w, had a show of oil in the Arbuckle at 3,362 ft. and set 5-in. casing at that depth. In Russell County, J. M. Huber 1 Holland, NW NE SW 31-13-13w, set pipe to 3,270 ft. and showed a small amount of oil after perforating and acidizing in the Lansing at 3,214-21 ft. Total depth is 3,385 ft. Also in Russell County, Nate Appleman 1 Meharg, SW SW SE 18-15-13w, swabbed 25 bbl. an hour for 5 hours. Arbuckle lime was topped at 3,280 ft. and at 3,285 ft. oil rose 2,300 ft. in 6 hours. The well has not been acidized. In Saline County, Margay Oil Co. 1 Anderson, NW SW 3-16-3w, had 3,000 ft. of oil in the hole and was pumping 17 bbl.

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of oil an hour in Viola lime topped at 3,304 ft. Skelly Oil Co. 1 Campbell, SW NE NW 32-24-15w, was reported to be flowing 150 bbl. of oil a day in Kinderhook shale after finding the Arbuckle dry. This is a new pay zone for the Farmington pool.

FOREST CITY BASIN

ST. JOSEPH, Mo.—F. C. Miller and Harry Harper had a dry hole at 1 J. H. Simpson in NE SW 32-60n-37w, Holt County, Missouri, east of Oregon. Drilling stopped at 2,198 ft., in the Hunton limestone. Although the well was dry, presence of a structure was indicated, for it ran at least 50 or 55 ft. lower than Skelly Oil Co. 1 Markt, drilled in 1942 hardly three-quarters of a mile to the southeast.

Several wells are awaiting drilling in, in Richardson County, Nebraska. These are in the Falls City, Ogle and Barada pools. Equipment and workers are scarce and delays are lengthly.

MISSISSIPPI

Trouble With Water Shutoff Halts Cranfield Completion

JACKSON, Miss. — The California Co. has been unable to shut off water in 1 Ella G. Lees, 52-7n-1w, Cranfield area of Adams County. Several tests in the 4,300-ft. sand flowed oil and water. The latest test was through perforations at 4,372-82 ft. with 2-in. tubing set at 4,370 ft. The well flowed 120 bbl. of fluid per day, 40 to 90 per cent salt water, on 3/16-in. choke, with tubing pressure of 100 lb. Although drilled to total depth of 5,887 ft., it evidently failed to show satisfactorily in the 5,800-ft. discovery sand and casing was set only to 4,445 ft. to test the upper Wilcox, topped at 4,102 ft. The company's 2 National Gasoline Co. of Louisiana, Inc., in 53-7n-1w, same field, was drilling ahead below 8,820 ft. in chalk.

Carter Oil Co. failed to find commercial shows in 1 O. H. Billingslea, wildcat in 30-11n-4e, Madison County, and plugged the hole at total depth of 6,748 ft. after running log and taking sidewall samples. Tuscaloosa was topped at 6,146 ft., Massive sand at 6,402 ft. and Lower Cretaceous at 6,748 ft.

Humble Oil & Refining Co.'s deep test in Greene County, 1 I. A. Hurst, 33-5n-8w, drilling ahead 12,100 ft. in shale, is one of the deepest holes drilled in this part of the state.

MISSISSIPPI WILDCAT COMPLETIONS

Jeff Davis County: Freeport Sulphur Co. 2 J. J. Newman, 33-6n-19w, on Oakville dome, dry at 2,332 ft.

Madison County: Carter 1 O. H. Billingslea, 30-11n-4e, dry at 6,748 ft. Top Eutaw at 5,002 ft., Tuscaloosa 5,724 ft., Marine Tuscaloosa 6,146 ft., Massive sand 6,402 ft., Lower Cretaceous 6,630 ft.

Turner Valley Oil Reserve Placed at 189,000,000 Bbl.

CALGARY, Alta. — Testifying before Alberta Public Utilities Commission, Dr. B. B. Boatright, petroleum engineer and consultant, estimated the total recoverable oil in the Turner Valley reservoir at 189,000,000 bbl. divided as follows:

	Production to Sept. 1943 (bbl.)	Reserve in formations (bbl.)
Naphtha	8,700,000	1,100,000
Nat. gasoline	4,400,000	4,800,000
Crude	49,500,000	120,500,000

Doctor Boatright estimated the oil area at 17,000 acres, though, being basically limestone, the field might be spotty. He foresaw possible further extensions north and south, with chances of water encroachment on the west.

CRUDE-OIL PRICES

Representative selected crude prices from all sections of the country appear below:

East Texas	$1.25
Conroe	1.43
Tepetate, Louisiana	1.18
Illinois basin	1.37
Pecos County, Texas	.95
Bradford, Pennsylvania	3.60
Van, Van Zandt County, Texas*	1.00

*No change since 5-21-41.

Gravity Schedules

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity—	Signal Hill, Calif.	Okla-homa, Kansas	Gulf Coast Texas	West Texas*
18-18.9	$0.80	...	...	
19-19.9	.84		$1.06	$0.70
20-20.9	.88	$0.85	1.08	.72
21-21.9	.92	.87	1.10	.74
22-22.9	.96	.89	1.12	.76
23-23.9	1.00	.91	1.14	.78
24-24.9	1.03	.93	1.16	.80
25-25.9	1.07	.95	1.18	.82
26-26.9	1.11	.97	1.20	.84
27-27.9	1.15	.99	1.22	.86
28-28.9	1.18	1.01	1.24	.88
29-29.9	1.20	1.03	1.26	.90
30-30.9	1.23	1.05	1.28	.92
31-31.9		1.07	1.30	.94
32-32.9		1.09	1.32	.96
33-33.9		1.11	1.34	.98
34-34.9		1.13	1.36	1.00
35-35.9		1.15	1.38	1.02
36-36.9		1.17	1.40	1.04
37-37.9		1.19	1.42	1.06
38-38.9		1.21	1.44	1.08
39-39.9		1.23	1.46	1.10
40 and above		1.25	1.48	1.12

*Includes Lea County, New Mexico.

LEGAL

U. S. DEPARTMENT OF AGRICULTURE Farm Security Administration, Dallas, Texas. Separate sealed bids, in triplicate, will be received until 2:00 o'clock P.M. (cwt), Monday, January 3, 1944, and then publicly opened, offering bonus for operating rights in connection with oil and gas leases on two tracts of land, Garvin County, Oklahoma—Tract 1—containing 307.23 acres and Tract 2—70 acres, in which the Government owns a three-eighths interest in the mineral rights. Award of lease will be made to bidder who can show sufficient experience and financial resources and prove citizenship. Interested parties may obtain bid documents, lease forms and operating regulations from the office of the Regional Business Manager, Farm Security Administration, Parry Avenue at Commerce, Dallas, Texas.

WILDCAT COMPLETIONS

	Week ended December 11, 1943					Cumulative total for 1943				
	Oil	Distillate	Gas	Dry	Total	Oil	Distillate	Gas	Dry	Total
Ohio	0	0	1	1	2	4	0	24	55	83
Indiana	0	0	0	0	0	4	0	0	52	56
Kentucky	0	0	0	5	5	20	0	2	113	136
Illinois	3	0	0	5	8	78	0	3	386	467
Michigan	0	0	1	2	3	11	0	3	165	179
Kansas	0	0	0	6	6	55	0	1	353	409
Nebraska-Missouri-Iowa	0	0	0	1	1	0	0	0	25	25
Oklahoma	0	0	0	5	5	42	1	18	246	307
Texas:										
North Central	4	0	0	9	13	58	0	1	348	407
West	0	0	0	4	4	14	0	1	83	98
Panhandle	0	0	0	0	0	0	0	0	6	6
East	0	0	0	3	3	5	1	2	99	107
Gulf Coast	1	0	0	5	6	7	8	7	133	155
Southwest	4	0	1	4	9	25	11	5	260	301
Total	9	0	1	25	35	109	20	16	929	1,074
Louisiana:										
North	0	0	0	0	0	6	0	4	65	75
Gulf Coast	0	0	0	1	1	14	9	1	31	55
Total	0	0	0	1	1	20	9	5	96	130
Arkansas	0	0	0	0	0	2	0	0	60	62
Mississippi and Southeast	0	0	0	2	2	6	0	0	68	73
Montana	0	0	0	0	0	6	0	4	25	35
Wyoming	0	0	0	0	0	6	0	1	15	22
Colorado, Utah	0	0	0	1	1	0	0	1	7	8
New Mexico	0	0	0	0	0	6	0	2	26	34
California	0	0	0	3	3	7	0	9	136	152
Total United States	12	0	3	57	72	376	30	89	2,757	3,252
Total previous week	2	2	3	57	64					

AN important Mississippi lime discovery was completed last week in Clay County, North Central Texas. Shell Oil Co. 1 R. F. Wynn, located 4½ miles west of the town of Bellevue, extended production to the eastern part of the county. Perforated and acidized in the lime at 6,253-83 ft. the well made a flow of 1,980 bbl. of oil and 48 bbl. of water. The Ellenburger at 6,706-95 ft., total depth, was dry. In Jones County, West Central Texas, a new pool was opened 7 miles north of Anson. Great Lakes Carbon Co. 1 Hardy opened the Hardy pool with a flow of 154 bbl. in Canyon sand at 3,690-3,706 ft.

The jump in oil discoveries to 12 last week was bolstered by three new-pay wells and an extension in Southwest Texas. The extension well was 1¾ miles south and east of the LaRosa field of Refugio County. Flow of 91 bbl. was through ⅛-in. choke.

The total of 1,732 completions in November was up 6 per cent over the previous month. Oil wells were up 4 per cent and the number of active rigs and drilling wells showed a 5 per cent increase. With the exception of Illinois, which took a sharp drop, the increase was reflected in nearly all areas. Comparable figures for November 1942 are 1,353 completions, of which 765 were oil wells, and 2,230 wells in progress.

SUMMARY OF OPERATIONS, NOVEMBER 1943

	Comp.	Oil	Prod.	Gas	Dry	Under 1,000 ft.	1,000-2,500 ft.	2,500-5,000 ft.	5,000-10,000 ft.	Over 10,000 ft.	Footage	Rigs and drilling
Appalachian	*275	170	414	79	26	1	48	223	3	0	521,125	350
Ohio	103	22	461	40	41	15	22	64	2	0	281,087	183
Indiana	22	9	582	1	12	4	14	4			40,310	45
Kentucky	78	22	1,600	21	35	12	39	27	0	0	141,594	151
Michigan	74	29	6,410	2	43	0	36	38	0	0	191,126	102
Illinois	131	81	12,578	0	50	3	50	78	0	0	341,426	218
Kansas	163	80	21,025	3	80	1	14	146	2	0	546,541	265
Nebraska	1	1	60	0	0	0	1	0	0	0	2,163	4
Missouri, Iowa	0	0	0	0	0	0	0	0	0	0	0	3
Oklahoma	116	67	12,235	9	40	9	25	60	21	1	413,214	361
North Texas	115	61	23,256	1	53	17	47	32	19	0	313,194	77
West Central Texas	37	15	10,455	0	22	4	17	12	4	0	93,900	19
West Texas	113	98	43,566	0	15	2	13	63	34	1	511,917	98
Texas Panhandle	22	16	2,916	3	3	0	0	21	1	0	71,366	9
East Texas	24	10	4,561	3	11	0	0	7	17	0	139,434	42
Upper Gulf Coast	51	23	6,474	2	26	0	1	5	41	4	365,400	83
Lower Gulf Coast	32	20	3,512	1	11	0	0	7	25	0	200,565	110
South Central Texas	12	1	120	0	11	2	6	2	2	0	31,645	13
South Texas	34	11	926	1	22	0	3	19	12	0	163,093	59
Total Texas	440	255	95,786	11	174	25	87	168	155	5	1,890,514	510
Southeast New Mexico	20	14	4,500	0	6	0	3	17	0	0	69,204	50
Arkansas	32	17	3,642	0	15	0	4	18	9	1	150,309	55
North Louisiana	39	17	1,980	10	12	0	16	8	15	0	157,608	54
Louisiana Gulf	33	22	4,936	0	11	0	0	0	13	20	309,875	98
Mississippi	17	2	310	0	15	0	4	8	5	0	80,054	22
Montana	19	12	750	3	4	0	9	8	2	0	48,922	91
Wyoming	9	7	7,950	2	0	0	1	4	4	0	43,920	85
Colorado, Utah	2	0	0	0	2	1	0	0	1	0	8,729	30
Northwest New Mexico	1	0	0	0	1	1	0	0	0	0	730	14
California	157	131	22,570	1	25	4	60	62	27	4	540,919	212
Total November	1,732	958	197,789	182	592	76	433	933	259	31	5,779,370	2,903
Total October	1,636	923	209,431	175	538	82	431	887	211	25	5,312,717	2,756

*Does not include 136 input wells.

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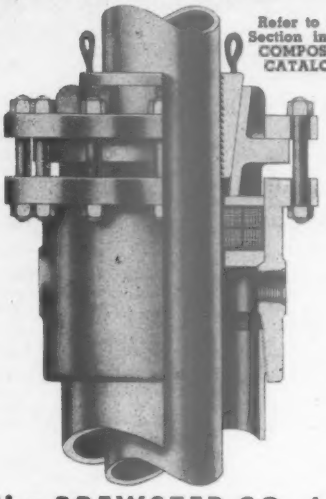

Refer to our Section in the COMPOSITE CATALOG.

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Among the Drilling Contractors

Longhorn Drilling Co., San Antonio, Tex., has been awarded the contract to drill Henderson Coquat's 1 W. L. Brewer, wildcat 660 ft. west and 1,322 ft. south of the northeast corner of W. L. Brewer lands in the Whitsett area of Live Oak County, Texas. It is a 6,000-ft. Wilcox test.

O'Kane & Brain, drilling contractors, completed 1 Capital for General Petroleum Corp. and opened up a new gas field near the town of Colusa, Calif., in 15-16n-1w.

Otis Hoyt has been awarded a contract to drill a new well for Standard Oil Co. of California, in the Richfield field, California, on the Anaheim property.

Texas Petroleum Co., San Antonio, Tex., is the contractor on Highland Oil Co. 6 Halff & Oppenheimer in the Pearsall area of Frio County, Texas. This test is in J. H. Gibson Survey 16, on a 1,242-acre lease.

Mercury Drilling Co. is drilling below 2,000 ft. on a wildcat for Phillips Petroleum Co. in 21-26s-9w, Reno County, Kansas. Mercury is also drilling the 2 Cromb for Stanolind Oil & Gas Co. in the west extension of the Ellis field in Trego County, Kansas, and the 3 Sellens for Texas Co. in the Sellens pool, Russell County, Kansas. They have just completed the 1 Case and the 4 Peterman, both good wells, for Gulf in northern Barton County.

Falcon-Seaboard Drilling Co., Houston, Tex., has received from Barnsdall Oil Co. the contract to drill 1 J. Fusilier, wildcat in the West Tepetate area of Acadia Parish, Louisiana, in 31-7s-2w. Proposed depth is 10,000 ft.

Dunlap & Graham, drilling contractors, are making preparations to drill a new well on the Hellman property in the Seal Beach, California, field for the Hellman estate.

C. C. Gilger, Shreveport, La., who drilled the Kildare pool discovery in Cass County, Texas, has been awarded the contract to drill a wildcat test for L. M. Bradford and Herschel Scivally 3 miles west of Jefferson, in Marion County, Texas. The test, projected to go to 6,300 ft., is part of a program designed to expand the natural-gas resources of that region.

Nicklos Drilling Co., Houston, Tex., has the contract to drill Continental Oil Co. 1 H. J. Shoesmith, wildcat about 8 miles north of the Roanoke field in Jeff Davis Parish, Louisiana, 330 ft. south and east of the northwest corner of 1-8s-4w. Contract depth is 9,500 ft. and rig is being installed at the location.

Drilling & Exploration Co. has a derrick up for Union Pacific Railroad's well No. 222 at Wilmington, Calif., and will spud in as soon as a crew becomes available.

Sprenger Brothers have been awarded the drilling contract on Harold E. Smith 1 Lechleitner, in NW NE SW 2-1n-9w, Barry County, Michigan.

R. A. Wells has the drilling contract on Arthur E. Williams 1 Mae Ryan, in SW SW SE 32-10n-1w, Gratiot County, Michigan.

Lupher Drilling Co. will drill Pure Oil Co. 1 Anderson-Billings Comm., in C E½ NW NE 8-14n-11w, Newaygo County, Michigan.

Two States Drilling Co. will drill Ohio Oil Co. B-1 Ohio-State Roscommon, in N½ SW NE 29-21n-3w, Roscommon County, Michigan.

Jack W. Frazier, Houston, Tex., has the contract to drill Frank J. Gravis

EQUAL DISTRIBUTION OF PRESSURE

UNIBOLT Couplings with their three interlocking shelves, or 3-point suspension, employ a proven principle and thus assure equal distribution of pressure on the seal ring.

★

THORNHILL-CRAVER COMPANY
HOUSTON

Crew on Jack Grace's No. 3 rig at work on the Whitaker 1 Gadberry, Hildreth pool, Montague County, North Central Texas. Left to right: Roy Ogletree, driller; F. A. Deemer, backup man; J. D. Bowen, derrick man, and S. S. Cutler, pipe racker

33 G. W. Burkitt in the Dyersdale field of Harris County, a west-side test. Frazier is moving his rig from the recently abandoned test in Fayette County to the Gravis location.

Morris-Hamilton Drilling Co., Houston, Tex., which has been drilling steadily for many months for Union Oil Co. of California in the Vinton field of Calcasieu Parish, Louisiana, received the contract to drill the company's 1-A F. H. Gray unit, 1,650 ft. south and 330 ft. east of the northwest corner of 33-10s-12w. The hole has been spudded and 10¾-in. surface casing set to 681 ft. The test is projected to 6,000 ft.

Parker Drilling Co., Tulsa, has contract for Sohio Producing Co. 1 Hauser, a Trego County, Kansas, wildcat test, NE NE NE 19-15-24w. Location is 7 miles northwest of Sohio and Falcon-Seaboard Drilling Co. 1 Frevele, C SE SE 22-16-25w, northwestern Ness County discovery in the Mississippi lime which originally produced 6 bbl. an hour after acid treatment. Pay zone in the discovery has been treated a second time and operators continue testing production.

Noble Drilling Co., Houston, Tex., is the contractor on Amerada Petroleum Co.'s 11 C. E. Gheens, at Bayou des Allemands in Lafourche Parish, Louisiana. This test, 10,155 ft. south and 1,980 ft. east of the northeast corner of 13-15s-20e, but in 39-15s-21e is an 11,000-ft. field extension test.

Drilling Contractors, Ltd., Calgary, Alta., will drill an outpost ¼ mile west of the most northern producing well in the Turner Valley north extension for Home Oil Co. Location is for 18 Home-Millarville, LSD 7, 18-21-3w5.

Markley - Bankhead Drilling Co., Houston, Tex., will drill for Southwestern Oil Refining Co. 1 Schwing, in 62-7s-9e, about a mile west of Sugarfield Oil Co.'s discovery well in the Rosedale area of Iberville Parish, Louisiana. This test will be carried to 12,000 ft.

Rotary Drilling Co. of San Antonio, Tex., has received a contract from Southwood Oil Co. et al to drill 1 Cannon estate, wildcat in Karnes County, Texas, in Antonio Lombrano Survey, about 2½ miles northeast of Karnes City. It is a scheduled 5,500-ft. Wilcox test.

TUBING PROTECTORS

Eliminate abrasion.
Prevent holes in casing.

PATTERSON BALLAGH CORPORATION

Los Angeles Houston New York City

WEB WILSON Rotary Tongs

See pages 3101 to 3120 of forthcoming Composite Catalog.

MEDIUM SERVICE TYPE B

Meets the need for a lighter, shorter Tong for regular rigs and the heavy, portable or Blitz rigs. Strong, fast, easily operated and safe for the worker.

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W. W. WILSON BUILDING
HUNTINGTON PARK, CALIF.

FREE: Paper on Well Cementing

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Write for your FREE COPY of "Index for Well Completions" by Jesse E. Hall, Sr. It is probably the most informative and helpful paper ever written on well cementing, including cementing practice in setting through zones.

The paper incorporates valuable instructions on the application of Weatherford Scratchers and Spiral Centralizers on all types of jobs.

WEATHERFORD SPRING COMPANY

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We will gladly stock your favorite supply store with WEATHERFORD products if it doesn't already have them.

PERSONALS

Heads Northwest's Manufacturing And Selling

MANUFACTURING and marketing activities of Northwest Refining Co., Cut Bank, Mont., have been combined under the direction of T. J. Landry.

Landry, who attended New Hampshire State College and Boston University, left the latter institution to serve in World War I. Upon being mustered out, he joined Mid-West Refining Co., Salt Creek, Wyo., in 1919, and for 3½ years was operating foreman of its natural-gasoline plant. In 1922 he supervised construction of the gas pumping plant for Fargo Oil Co. at Poison Spider, Wyo., later designing and constructing the Reliance Refining Co.'s plant at Kalispell, Mont.

In 1924, Landry became Montana manager in charge of production, refining and sales for Montana Giant Petroleum Co., at Kevin, Mont. The next year he took charge of Louis B. O'Neil's refinery at Lethbridge, Canada, holding that post until 1926, when he was made superintendent of International Refining Co.'s plant at Sunburst, Mont. He continued to operate the plant when it was purchased by Texas Co. and in 1932 was transferred to Texas Co.'s refinery in Amarillo, Tex. Two years later Texas transferred him to Houston as superintendent of its plant near there.

In 1936, Landry returned to Montana, where, in association with O'Neil, he constructed Northwest Refining Co.'s plant at Cut Bank. He was vice president in charge of manufacturing for Northwest when that concern's interests were purchased by Carter Oil Co.

A. C. Rubel, vice president of Union Oil Co., and **Ralph K. Davies,** deputy petroleum administrator, are scheduled to speak on secondary-recovery methods and the Pacific Coast oil industry in the war at the annual meeting of the San Joaquin Valley Oil Producers Association, which is to be held in Bakersfield, Calif., December 28.

Richard W. Sherman, vice president of British-American Oil Producing Co., which has production in the Ventura Avenue, Montebello and other California fields, has submitted his resignation to become effective January 1, 1944, to enter private consulting practice in Los Angeles. Sherman, who was chief geologist of Barnsdall Oil Co. at the time that company discovered the Newhall Potrero field, became associated with British-American in June 1937, and was elected vice president in charge of California operations early in 1941.

H. C. MILLER

Harold C. Miller, senior petroleum engineer, Oakland, Calif.,; **William M. Deaton,** senior chemist, Amarillo, Tex., and **Ellis H. Frost, Jr.,** chemical engineer, Shiprock, N. M., veteran employes of U.S. Bureau of Mines, received Awards of Excellence from Secretary of the Interior Harold L. Ickes recently for their contributions

W. M. DEATON

E. H. FROST, JR.

to wartime services. Miller, at the top of his Civil Service grade, will be recommended for a job reclassification upward. Deaton and Frost will receive annual salary increases of $200 each. Miller devised a method of determining whether the source of energy driving oil through sands and porous rocks to the wells is the result of gas expansion, natural water drive, or a combination of the two. Deaton and Frost developed a device which determines the temperature at which natural gasoline will condense from natural gas under pressure.

Ivan S. Salnikov, chief engineer in the production department of Carter Oil Co., Tulsa, and **M. A. Wright,** assistant to **J. R. McWilliams,** manager of production, have received promotions, it is announced by the company. Salnikov, who is to be an associate of **M. L. Haider, of** Standard Oil Development Co., with offices in Rockefeller Center, New York, has been in Carter's service since his graduation from Colorado School of Mines in 1925. Working first as a roustabout in the Burbank field, Oklahoma, he soon was promoted to petroleum engineer. Later he was made division engineer at Seminole, Okla., and then division superintendent at Burbank. Advancement to his present post followed. Wright, who will replace Salnikov, graduated from Oklahoma A. and M. in 1933 and went to work for Carter as a student engineer at Seminole. He soon was made a petroleum engineer, working in various districts, and then was assigned to the South Burbank unit as division engineer. A year later he was named division engineer of the central division, comprising Oklahoma and Kansas. In 1941 he was sent to Shreveport, La., as division engineer of Carter's southern division. Last June he was transferred to the main office in Tulsa. The new promotions become effective January 1.

I. S. SALNIKOV

M. A. WRIGHT

Dr. Wallace E. Pratt, geologist and vice president of Standard Oil Co. of New Jersey, gave a talk before a group at Columbia University, New

York, last week, in the course of which he declared his belief that United States has "a probable true petroleum reserve to last at least 100 years."

Shifts: **W. S. Law,** superintendent, Superior Oil Co., Conroe, Tex., to Lafayette, La.; **C. W. Alexander,** geologist, Phillips Petroleum Co., Shreveport, La., to Jackson, Miss.; **F. L. Melville,** engineer, Foster Wheeler Corp., New York City to Johannesburg, South Africa; **J. Earl Gray,** engineer, Shell Oil Co., Inc., McPherson, Kans., to Pampa, Tex.; **Harvey J. Stone,** superintendent, Norbla Oil Co., Hominy, Okla., to Canal Zone; **Robert L. Ferris,** engineer, Shell Oil Co., Inc., Tulsa, to Centralia, Ill.

Edward Stewart, Mount Pleasant, Mich., an official of Stewart Petroleum Corp., has resigned as a member of the Michigan Oil Advisory Board. His resignation leaves two vacancies on the board to be filled by the state Conservation Commission, the other having resulted from the death of Edward F. Claggett, of Saginaw.

Arthur J. Renaud, formerly of Fort Worth, Tex., and recently of Houston, Tex., and Shreveport, La., has moved to Midland, Tex., where he will open an office of the H. L. Hunt interests.

John Niles Gray, geologist and petroleum engineer for Cia. Consolidada de Petroleo at Caracas, Venezuela, has been made production foreman for the company.

H. T. Ashton, general manager of the Lubrite division of Socony-Vacuum Oil Co., Inc., St. Louis, Mo., is chairman of the manpower subcommittee of District 2 petroleum industry marketing committee, which will conduct a survey of employes of bulk plants. The subcommittee was appointed by **B. L. Majewski,** chairman of the marketing committee.

L. M. Glasco, oil operator of Lubbock, Tex., has purchased a residence in Dallas, Tex., and will move to that city.

H. C. Arnold, executive vice president of British American Oil Producing Co. and Toronto Pipe Line Co., with headquarters in Tulsa, is visiting the Rocky Mountain area in connection with projected construction of a pipe line from the new Steamboat Butte field to railhead.

Dr. Ben H. Parker, of Colorado School of Mines, and geologist for Frontier Refining Co., was elected president of Rocky Mountain Association of Petroleum Geologists at the annual meeting in Denver December 6. **Dari Wantland,** geophysics department of the School of Mines, was elected first vice president; **Dr. William B. Kramer,** of U. S. Geological Survey, second vice president; **Dr. A. W. Weeks,** of Petroleum Administration for War, secretary and treasurer.

L. L. Marcell closed an oil career of 40 years December 8 when he retired as general manager of the White Eagle division of Socony-Vacuum Oil Co., with headquarters in Kansas City, Mo. Officials of the company attended a testimonial dinner given for him. Marcell's boyhood was spent on a farm in Ripley County, Missouri.

Bryan Patterson, independent oil operator of San Antonio, Tex., for the past year on the staff of the Oil and Gas Division of Texas Railroad Commission, with an office in Corpus Christi, has resigned that post and returned to San Antonio to reenter the oil business as an operator and contract driller.

Stanley C. White, formerly a member of the geological staff of Ohio Oil Co. in Tulsa and later assistant chief geologist for the company in Findlay, Ohio, is now in charge of a geological party which Ohio is operating in Maryland, where the company is said to have several hundred thousand acres of land under lease.

Harold Stollenberg, formerly in Phillips Petroleum Co.'s geological department in Bartlesville, Okla., has been transferred to the company's Midland, Tex., office.

J. P. Okie, who was head of the gas department of Shell Oil Co., Inc., Houston, Tex., has been transferred to Cactus Ordnance Plant, Dumas, Tex., as operating superintendent. **P. E. Malson,** formerly head of the gas department at Norco, La., succeeds him. **W. P. Svec** is Malson's successor.

Carl Lee, new general superintendent of the Texas-Gulf area for Shell Oil Co., Inc., with headquarters in Houston, Tex., was advanced from drilling superintendent in that area. Lee has been in Shell service 26 years, starting with the old Roxana Petroleum Co. as a lease foreman at Yale, Okla. **Richard Myers** succeeds Lee as drilling superintendent in the Texas-Gulf area, with his office in Houston. Myers started as a driller with Roxana in 1926 and at the time of his recent promotion was division drilling superintendent in Houston.

Dr. Fred M. Bullard, professor of geology at University of Texas, has taken over the lecture tour started by **Dr. Ezequiel Ordonez,** geologist, of National University of Mexico, who was seized with illness and compelled to return to Mexico City. Doctor Bullard last summer was associated with Doctor Ordonez in the study of Paracutin volcano in Mexico, the subject of the lecture tour. He is to speak in Houston, Tex., December 17.

C. S. Wimpress has been relieved of his duties with Union Oil Co. of California in order that he may devote his entire time to PAW as secretary of the District 5 Refining Division.

Stuart Buckley, head of the production research department of Humble Oil & Refining Co., Houston, Tex., presented an illustrated lecture recently on "Development and Control of Oil Reservoirs" before the student section of A.I.M.E., University of Texas.

Joseph Gordon, chief of the Economics and Supply Section, Petroleum Administration for War, has resigned to reenter private business as an economic and financial consultant on petroleum matters, with headquarters in New York. Gordon has been largely responsible for studies on crude-oil prices undertaken in PAW, and has urged the necessity for a general price increase to avert a crude-oil shortage. Prior to his connection with PAW he was in charge of petroleum investments for a New York house and before that was with Consolidated Oil Corp.

Lloyd L. Jordan, who was in charge of the Magnolia district office of Arkansas Oil and Gas Commission, has been moved to El Dorado to replace **C. H. Thigpen,** who has joined the staff of U. S. Geological Survey in Tulsa. **Emon E. Clark,** petroleum engineer, has been placed in charge of the Magnolia office, having been released for 6 months from the Army in the Enlisted Men's Reserve, to give the commission time to engage another engineer and train him.

A. K. Kavrushko, N. J. Bonda, J. Catlin, A. K. Inavov, M. P. Agaev, and **N. N. Kalmycov,** touring oil fields of the United States to study developments as representatives of the Russian Government, arrived in Midland, Tex., last week. They will survey operations in the Permian basin.

Glen Ames, division manager for Phillips Petroleum Co. in Tulsa, heads a committee of that city's postwar planning board charged with presenting a plan for a proposed civic center.

Stanley A. Bloch, previously employed by Douglas Aircraft Co., Santa Monica, Calif., has joined Texas Co., in Midland, Tex., as a junior petroleum engineer.

Market Developments

East Coast

NEW YORK. — Except for an increase in the ceiling price of 41-gravity kerosene in the Birmingham, Ala., area, the East Coast markets experienced an exceptionally quiet week. Office of Price Administration authorized an increase in the Birmingham area of ⅛ to ¼ cent for tank-car and tank-wagon prices for 41-gravity and above kerosene which became effective December 15.

Granting by the Office of Defense Transportation of permission to shift tank cars from East Coast to West Coast service was regarded by some as an indication that conditions on the East Coast have improved to such a degree that they can be regarded as comfortable. This belief is not substantiated by reports of conditions on either coast. Demand on the West Coast has grown to such proportions that importations from other areas are essential, and supplies on the East Coast, while generally better, are not yet sufficient to insure against hardship.

In the first week of December the position of all major products on the East Coast improved slightly but gasoline and kerosene stocks were still less than half of normal. The improvement, since index numbers have been issued by products, has been limited entirely to heating oil and gasoline.

The position of kerosene, due to the nature of demand and distribution, is serious, and difficulty in meeting requirements is anticipated. The recent improvement in gasoline indicates that, while stocks are low, supplies under existing rationing regulations are ample.

Gulf Coast

HOUSTON, Tex.—Stocks of gasoline and kerosene continued this week to cling to minimum operating levels while Gulf Coast refiners attempted to meet the rising demand both for local distribution and for offshore movement. A vast majority of the capacity of coastal plants is engaged in production of military fuels, ranging from 80-octane all-purpose gasoline through 91 and 100-octane material, leaving only the marginal facilities for manufacture of civilian products.

Movement of special products to the Pacific Coast by railroad tank cars is cutting into the available supplies of diesel fuel oil and plant operators are facing the necessity of increasing the volume available for overland shipment to California.

Installation of new facilities, many of which are just now becoming available for operation, will not relieve the tight market conditions prevailing in civilian products. The new plants, practically without exception, are for the specific purpose of manufacturing military fuels. In fact, the new processing units will feed chiefly on fractions previously available as gas oil or naphtha, thus tending to make deeper inroads on civilian supplies.

Mid-Continent

THE cold wave which swept the North Atlantic territory this week increased misgivings regarding the shortage of kerosene, and that product continued to be an object of diligent search in the Mid-Continent region. District 2 refiners said they were turning to plants in District 3.

Heavy fuel oil, ample stocks of which were available a few weeks ago, is now one of the scarcest of petroleum products in the Mid-Continent territory. Demands of railroads and industrial plants exceed supplies, and in efforts to meet the needs of buyers refiners are turning to plants in Texas, where the position of heavy fuels is reported to be less critical. Also railroads accustomed to filling their fuel-oil requirements in this district are now buying from plants in District 3. Some refiners who formerly used natural gas in their plants and who have been directed by the Government to change to fuel oil in order to conserve natural gas find themselves obliged to get the fuel needed from other operators because their own output is insufficient.

Notwithstanding a rise in the nation's stocks of gasoline, the shortage of that product for civilian use in the Mid-Continent was declared to be increasingly acute. Refineries within easy trucking distance of military flying fields are delivering large quantities of 73-octane material, which is used in training flights. Immense shipments of 80-octane gasoline are moving to all military camps for use as automotive fuel. Many inquiries for gasoline were reported this week to be coming from buyers in District 2, whose former sources of supply were drying up.

Although changes were reported in the quantities of natural gasoline assigned for different points of consumption, the total demand continued to become more urgent, and the market was described as extremely tight.

A.P.I. REFINERY REPORT

Week Ended December 4, 1943

(Figures in thousands of barrels)

	Dly. crude runs to stills	Stocks: Gasoline	Stocks: Residual	Stocks: Gas oil
Appalachian	144	2,700	319	1,091
Ind., Ill., Ky.	787	13,653	2,845	6,399
Okla., Kan., Mo.	342	7,045	1,085	2,293
Censored area*	2,205	32,427	18,195	23,067
Rockies	96	1,291	768	438
California	757	13,924	38,391	12,069
Total 12- 4-43	4,331	71,040	61,603	45,357
Total 11-27-43	4,261	69,980	62,143	46,187
Total 12- 5-42	3,744	71,872	75,980	49,273

*Reports combined on East Coast, Texas Gulf Coast, Louisiana-Arkansas and Inland Texas at request of PAW.

CRUDE-OIL STOCKS

(Bureau of Mines estimate)

Week ended:	Bbl. of crude*
December 4, 1943	241,165,000
November 27, 1943	239,761,000
December 5, 1942	232,982,000

*Excludes unrefinable California stocks.

Pacific Coast

LOS ANGELES, Calif.—The full impact of increased demand by the military services has begun to be felt on the Pacific Coast and this week service stations started to ration gasoline sales to consumers. Some service stations will not pump over 3 gal. of gasoline into any one automobile tank while others will pump 3 gal. of Ethyl and 3 gal. of regular housebrand gasoline. This condition has been anticipated for some time and will become more pronounced as marketers have placed severe limitations on deliveries to service stations, the restriction averaging from 15 to 30 per cent.

The limitation imposed by marketers in Pacific Coast territory indicates quite conclusively that OPA has failed dismally and has been too liberal with B and C ration books. Instead of reducing mileage at the source, OPA has actually distributed more coupons than can be honored due to a smaller amount of gasoline available for civilian consumption. A consistent check made of automobiles entering Los Angeles metropolitan area shows that about 60 per cent of all cars with B and C ration books carry only the driver and that approximately 20 per cent carry one to two passengers. Unless something is done in the immediate future, the West Coast will be faced with a critical situation early in 1944.

Refinery Prices

Prices as of December 14, 1943)

Quotations are f.o.b. plant in cars and in cents per gallon except where otherwise noted. They are exclusive of the federal excise taxes of 1.5 cents a gallon on gasoline and 4.5 cents a gallon on lubricating oils, and do not include marine lighterage charges.

REFINERY GASOLINE

Octane (A.S.T.M.):	80†	72-74	68-70	63-66
Mid-Continent*	†6.00-6.25	5.750-6.000		5.625
Gulf Coast	6.00-6.50	§5.750-6.250	§5.750-6.250	§5.250-5.750
Northeast Coast	9.80	9.2	9.2	
California		6.255.6.500	5.750-6.125	5.125-5.500

*Basis Group 3. †1939 C.F.R. (research method). ‡Inland Texas and adjoining counties in Arkansas and North Louisiana. §Unleaded.

KEROSENE AND NO. 1 FUEL OIL

Gravity:	46	45	42-44	41-43	38-40
Mid-Continent*			4.500	4.125-4.375	
North Louisiana*				4.125-4.375	
Pennsylvania	6.250-6.625	6.125-6.250			
California				‡ 500-5.500	4.250
Northeast Coast				6.80	
Gulf Coast				‡ 125	

*Reflecting OPA ceilings, depending on destination of shipments.

TRACTOR, DIESEL, AND BUNKER FUEL OIL

Specifications:	46-48° G	34 D.1	48-52 D.1.	58 & above	Diesel bunkers	Residual Bunker C†
Mid-Continent*	4.125		3.875-4.000	4.125-4.250		$0.80-1.27
California		2.750-4.000			†1 35-1 45	1.10-1.15
Gulf Coast			4.000	4.125	1.45	0.85-1.27
Northeast Coast				6.800	2 750	1.65-2.07
North Louisiana						0 80-1 27

*Basis Oklahoma Group 3. †Gravity range ‡Pacific Specification 300

FURNACE OIL, GAS OIL, FUEL OIL

	No. 2	No. 3	No. 5	No. 6
Mid-Continent*	3.500-3.625	3.375-3.500	$0.85	$0.80
Pennsylvania (West)	5.875-6.125	5.875-6.000	†5.250-5.500	
Northeast Coast	6.7	6.7	1.95	1.65
California	5.5	5.5	‡1.10-1.25	‡1.10-1.15
Gulf Coast	3.750-3.875		1.35	0.85

*Basis Oklahoma Group 3. †36-40 gravity fuel. ‡Pacific Specification 300 §Pacific Specification 400.

NATURAL GASOLINE

Grades:	26-70	18-56
Oklahoma (Group 3)	4.750	5.700
North Texas	4.375	5.250
North Louisiana	4.375	5.250
California	4.875	5.500

LUBRICATING OILS

Bright and Steam Refined

OKLAHOMA (Group 3)—

200-210 D. 10-25	27.00
150-160 D, 0-10	23.00
120-125 D, 0-10	22.00
Steam refined:	
600 dark green (untreated)	9.00

PENNSYLVANIA—

Bright Stocks (Pennsylvania Grade No. 8 color, 140-150 at 210, 545-550 flash)

10 pour point	30.50
15 pour point	29.50
25 pour point	28.00
Steam refined:	
600	16.00
650	16.50
600 flash	17.50
650 flash	17.50

Neutral Oils

Vis at 100° F. (except Pennsylvania and color N.G.A.)

OKLAHOMA (Group 3)—

0-10 pour point:	
200-S	15.00
300-S	18.00
500-S	19.50
600-S	20.00

Note: Viscous neutrals, 10-25 pour quoted 0.5 cent under 0-10 oils.

CALIFORNIA—

200-3½-S	7.00	7.75
400-3-4	7.25	8.00
600-3-4	8.75	11.00

Neutral Oils

200-4-5	7.00	7.75
400-5-6	9.00	11.00
500-900, 5-6½	9.25	11.25

GULF COAST—

Pale oils:		
200-3	8.50	8.75
300-3	9.00	9.25
500-3½	9.75	10.00
750-3½	10.00	10.25
2,000-4	10.50	10.75
3,000-4	12.25	12.50

PENNSYLVANIA—

150 vis. at 70° F., 3 color, 400-405 flash:

Zero pour point	37.50
10 pour point	36.50
15 pour point	35.50
25 pour point	30.00
200 vis. at 70° F., 3 color:	
Zero pour point	39.50
10 pour point	38.50
15 pour point	37.50
25 pour point	32.00

WAX

(Cents per pound)

OKLAHOMA (Group 3)—	
124-126 (A.m.p.) w.s. scale	4.250
PENNSYLVANIA (inland refineries)—	
122-124 (A.m.p.) w.c. scale	4.250
124-126 (A.m.p.) w.c. scale	4.250
NEW YORK—	
Wax in bags fully refined	
130-132 (A.m.p.) wax	5.850
133-135 (A.m.p.) wax	6.150
Crude scale:	
124-126 (A.m.p.) w.s	4.250
124-126 (A.m.p.) y.s	4.250

TANK-WAGON PRICES IN 50 CITIES

(Gasoline prices based on regular grades, tax included, undivided dealer)

ATLANTIC AND NEW ENGLAND

(Socony-Vacuum Oil Co., Inc., and Atlantic Refining Co.)

	Dealer tank wagon	Combined tax	Kero tank wag.
Baltimore, Md.	15.95	5.50	10.50
Boston, Mass.	14.90	4.50	10.10
Burlington, Vt.	16.90	5.50	10.20
Buffalo, N. Y.	16.20	5.50	10.90
Dover, Del.	16.70	5.50	12.30
Hartford, Conn.	15.60	4.50	10.00
Manchester, N. H.	17.30	5.50	12.10
Newark, N. J.	15.20	4.50	10.00
New York, N. Y.	16.10	5.50	10.10
Philadelphia, Pa.	16.20	5.50	11.90
Pittsburgh, Pa.	16.70	5.50	12.30
Portland, Me.	16.30	5.50	10.20
Providence, R. I.	15.00	4.50	9.90
Washington, D. C.	15.20	4.50	11.30
Average 14 cities	16.02	5.14	10.88

(All prices undivided dealer basis.)

CENTRAL

(Standard Oil Co. of Indiana, Standard Oil Co of Ohio, Continental Oil Co. and Texas Co.)

	Dealer tank wagon	Combined tax	Kero tank wag.
Chicago, Ill.	14.10	4.50	10.60
Cleveland	15.00	5.50	*9.00
Dallas, Tex.	13.90	5.50	7.00
Des Moines, Iowa	14.40	4.50	10.10
Detroit, Mich.	14.40	4.50	10.00
Fargo, N. D.	16.90	5.50	11.60
Huron, S. D.	16.30	5.50	11.00
Indianapolis, Ind.	15.60	5.50	10.10
Little Rock, Ark.	17.50	8.00	10.00
Milwaukee, Wis.	16.10	5.50	10.80
Minneapolis, Minn.	15.90	5.50	10.60
Omaha, Neb.	15.40	6.50	9.80
Tulsa, Okla.	16.50	7.00	8.50
Wichita, Kans.	13.30	4.50	8.70
Average 14 cities	17.46	5.57	9.84

*Includes 1-cent state tax.

SOUTHEASTERN

(Standard Oil Companies of New Jersey, Kentucky, and Louisiana)

	Dealer tank wagon	Combined tax	Kero tank wag.
Atlanta, Ga.	18.90	7.50	*11.50
Birmingham, Ala.	18.50	8.50	9.00
Charleston, S. C.	18.95	7.50	
Charleston, W. Va.	19.25	6.50	13.30
Charlotte, N. C.	20.10	7.50	11.30
Jacksonville, Fla.	18.90	8.50	9.50
Jackson, Miss.	17.50	7.50	†9.00
Louisville, Ky.	16.50	6.50	8.50
Memphis, Tenn.	17.90	8.50	10.50
New Orleans, La.	17.75	8.50	10.00
Norfolk, Va.	17.45	6.50	12.30
Average 11 cities	18.34	7.50	10.50

*Includes 1-cent state tax.
†Includes ½-cent state tax

MIDWESTERN

(Continental Oil Co.

	Dealer tank wagon	Combined tax	Kero tank wag.
Albuquerque, N. M	17.50	7.50	10.00
Boise, Idaho	20.10	6.50	16.50
Casper, Wyo.	17.00	5.50	12.00
Denver, Colo.	14.50	5.50	11.00
Helena, Mont.	17.00	6.50	13.00
Phoenix, Ariz.	18.50	6.50	12.50
Reno, Nev.	17.50	5.50	13.50
Salt Lake, Utah	18.50	6.50	14.50
Average 8 cities	17.56	6.25	12.89

PACIFIC COAST

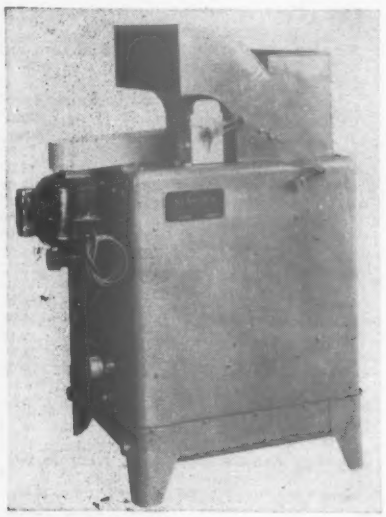
(Standard Oil Co. of California)

	Dealer tank wagon	Combined tax	Kero tank wag.
Portland, Ore.	17.00	6.50	13.80
San Francisco, Calif	14.50	4.50	11.50
Seattle, Wash.	17.00	6.50	13.50
Average 3 cities	16.17	5.83	13.03
Average 50 cities	16.59	5.96	10.90

Equipment Progress

Compressed Air and Gas Cooling Equipment

The new Niagara Aero after cooler for compressed air uses the evaporative cooling principle to obtain the lower temperatures and a new de-



sign gives greatly increased capacity in compact apparatus. Air, drawn by a fan through a water spray across coils containing the compressed air is the cooling medium and temperatures within 10° of the wet bulb air temperature can be maintained. This permits lower temperatures by 10° to 25°, than conventional coolers and produces compressed air that contains only one-half to three-fourths the amount of water formerly experienced with the best practice. The equipment is also applied to gases generated for industrial use. The manufacturer is the Niagara Blower Co., 6 E. 45th St., New York 17, N. Y.

Two Ethyl Plants Receive "E" Award

Employes of Ethyl Corp. plants at Deepwater, N. J., and Baton Rouge, La., recently received the Army-Navy "E" production award for "outstanding achievement in producing war equipment." Both plants are engaged in the manufacture of Ethyl fluid used in blending high-test motor fuels.

In ceremonies broadcast over the Louisiana radio net work Gov. Sam Jones commended the work of the Baton Rouge employes. Col. L. L. Koontz, commanding officer of Harding Field Army Airbase, presented the "E" pennant to Clinton W. Bond, resident manager for Ethyl, Harry M. Fisher, plant manager of the organic chemicals division of E. I. du Pont de Nemours & Co., and William Ross, plant manager of the electrochemical division of du Pont.

Capt. F. C. Nyland of the Civil Engineers Corps of the Eighth Naval district read the citation and presented lapel "E" pins to seven representatives of the workers. Ross J. Williams, member of the war effort committee, made the acceptance speech in behalf of all employes.

At the Deepwater Ethyl plant, which is located at the Du Pont Dye Works, Col. William D. Hamlin, executive officer, Office of Chief Signal Officer, U. S. Army, presented the pennant award to Charles Wasserman, resident manager of the plant, who accepted on behalf of the employes and management. L. W. Armstrong, C. H. Johnson, and Miss A. H. Wygand represented the employes in accepting "E" pins.

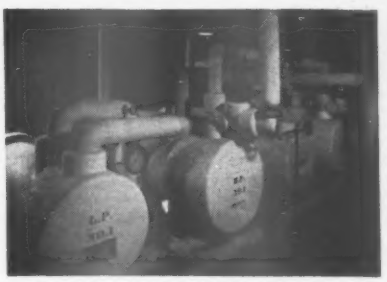
Water-Testing Equipment

A new test set for boiler water-control analyses is announced by W. H. and L. D. Betz, Gillingham and Worth Streets, Philadelphia, Pa. The

test set includes all the necessary apparatus and chemicals for the determination of hardness, alkalinity, chloride, sulfite, and phosphate. A special cabinet designed for use on table or wall is provided. All apparatus and chemicals are contained in the cabinet, held in a secure position and ready for instant use. A portion of the opened cabinet door forms a convenient acid-resistant laboratory work table and a fluorescent light provides correct illumination for the tests. The protection afforded by the cabinet minimizes breakage and eliminates errors caused by dust and dirt. A complete instruction book is included informing the operator how to perform the simple rapid tests and what the results mean in terms of plant control.

Heat Insulating Material

Advancements in the light-weight and low thermal conductivity of heat insulating material are now at the



command of engineers, in a new method of manufacture called the "Plant Precision Molded" process. The resulting product eliminates an average of 5.8 lbs. of dead weight per cubic foot, and averages 29 per cent better insulation than heat insulating-material weighing 16.8 lbs. per cu. ft. The new product capitalizes upon the insulation values of 85 per cent magnesia.

The new process assures controlled uniformity. The plus tolerance is only ½ lb. per cu. ft. New speed and ease of application, with resultant savings in labor, are enhanced by such advancements as super-smooth finish on both inside and outside surfaces of the product; greater "ductile strength", built right into the material to withstand vibration, accident shock, dropping and shipping much better than conventional-type materials; precision pipe fit. Both pipe coverings and blocks of the new material are molded to exact final size and thickness, eliminating the old manufacturing practice of molding 85 per cent magnesia pipe coverings and blocks oversize and then "milling" them to size. Further speeding its application, is the fact that the new product is manufactured in sectional form up to and including 18-in. pipe size. Better working conditions for the applicator are assured, too, because it doesn't "powder" or "dust off". This also means less clean-up after the job is completed.

The new product is manufactured in the Emeryville, Cal., factory of

Plant Rubber & Asbestos Works. Inquiries should be directed to the company's San Francisco main office, 537 Brannan Street, Zone 7.

Trade Literature

Timken-Detroit Axle Co., Detroit, Mich.—"How to Load a Truck," a wall chart which pictures the wrong and right ways to load a truck. The chart measures 24 by 31 in.

Elliott Co., Jeanette, Pa.—Bulletins Y-15 and Y-17, on the new Elliott 1300 series tube cleaner with improved metallurgy, heat-treating and lubrication. Also, Bulletin H-14, on Elliott mechanical-drive turbines with built-in reduction gearing.

O. S. Tyson & Co., Inc., 230 Park Avenue, New York, N. Y.—Bulletin 320-A, covering the company's line of straightening and bending presses. The 38 pages of descriptive matter, illustrations and tables of work capacities are augmented by engineering tables and other technical data. Each different machine is fully described and illustrated.

"E" Award Renewed For Beaumont Iron Works

Beaumont Iron Works Co., Beaumont, Tex., recently received notice from C. C. Bloch, admiral, U. S. Navy, chairman of the Navy Board of Production Awards, to the effect that the board had granted a renewal of the company's Army-Navy "E" award for an additional period of 6 months.

Beaumont Iron Works Co. was awarded the Army-Navy "E" for outstanding production of war material on February 12 of this year.

Among Equipment Men

Dolan Made Sales Manager Of Le Roi Co.

Le Roi Co., Milwaukee, Wis., has announced the appointment of John M. Dolan as general sales manager. Mr. Dolan has a background of long experience in the machinery sales field.

After graduating from Northwestern University School of Engineering in 1927, he joined Dryden Rubber Co. in Chicago where he worked until 1930.

He then became associated with Sullivan Machinery Co. in the General Sales Division. After this he was made assistant to the general manager of the Western plant of that company. For the past 5 years he was manager of the Sullivan Compressor Division supervising both engineering and sales.

Backlund Heads Sales For Goulds Pumps, Inc.

Goulds Pumps, Inc., Seneca Falls, N. Y., has announced the appointment of Eric E. Backlund as sales manager of the company.

Mr. Backlund came with the company in 1923. After 2 years in the plant, he joined the export department and until 1932 traveled extensively in Central and South America. He was then made manager of Goulds Philadelphia office and served in that capacity until he returned to the headquarters office in 1935 as assistant sales manager, which position he has held until his present appointment.

Johnson Promoted By Norton Co.

Ralph M. Johnson has been appointed general sales manager of grinding wheels and abrasive grain for the entire United States by Norton Co. He will make his headquarters at the Worcester plant but travel extensively. Mr. Johnson has been Norton western sales manager since 1939.

Johnson was graduated from Worcester Polytechnic Institute in 1915 with a bachelor of science degree in chemistry. Shortly after graduation he joined the Norton research staff, working first in the organic laboratory and then in the mechanical laboratory. Then he worked for 5 years in the sales engineering department, ending his work there as assistant sales engineer.

In 1922, he was placed in charge of the Connecticut sales territory with headquarters at the Hartford office. In 1928 he was made manager of the Philadelphia warehouse and sales district. He continued in that capacity until 1934 when he was brought back to Worcester as chief sales engineer, leaving that post to take charge of Norton sales operations in the central and far-western sections.

Buda Holds Open House To Oil Men

Buda Engine Sales & Service, Inc. was host to several hundred oil men of Tulsa and vicinity at an open-house party at its plant at 517 West Archer Street, Tulsa, December 11, from 11:30 a.m. to 2:30 p.m. The party gave opportunity for the visitors to inspect the new and greatly expanded facilities which the company recently has provided. A buffet luncheon was served continuously, and entertainment included music, fun and frolic.

SERVICE PINS PRESENTED BY BAKER OIL TOOLS

Recently, Baker Oil Tools, Inc., held the second annual service-pin banquet for its California division. Left to right in the picture are R. C. Baker, Jr.; S. J. Ralston; G. M. Anderson; E. E. Pyles, guest speaker; T. Sutter; R. C. Baker; C. A. McDonald; A. C. Pazdernik. All of the Baker employes pictured are 20-year-service men, as are also T. H. Arney, A. A. Baker and A. H. Lake, who were unable to be present. A total of 31 employes were honored with pins representing 5 years, or more, of loyal service.

Eight employes of the central division of Baker Oil Tools, Inc., received service pins at a similar banquet held at Houston on November 19.

Classified Advertising

The Market Place for the Oil Industry

MAGNAFLUX INSPECTION
One day service
REGAN FLYING SERVICE
Shawnee, Oklahoma

UNDISPLAYED RATE

6 CENTS A WORD, minimum charge $2 per insertion.

SITUATIONS WANTED, 4 cents a word, minimum charge $1.

BOX NUMBERS, count 9 words when replies are to be sent to our Tulsa Office.

10% DISCOUNT if 3 insertions are ordered at one time, with check accompanying order.

All classified advertising payable in advance.

DISPLAYED—PER INCH

Classified display advertising set in single or double column style:

1 inch	1 time	$7.00
1 inch	13 times	6.50
1 inch	26 times	6.00
1 inch	39 times	5.50
1 inch	52 times	5.00

Rates are governed by total space used within 12 months from date of first insertion. Credits are allowed when lower rates are earned.

FORMS CLOSE 9:00 A.M. MONDAY
Published Each Thursday

Due to the pressure of business and the shortage of paper, necessitating an earlier estimate of space needed, Classified Advertising forms will close each week at 9 a.m. MONDAY, effective January 1, 1944. Any advertisement received after that hour will be held over for the next issue.

LEGAL BLANKS

OIL FIELD LEGAL BLANKS
Leases, assignments, releases, township plat books, well records, etc. Request on your letterhead gets free catalog. Olds Press, 215 East Third St., Tulsa, Okla.

PATENT ATTORNEYS

PATENTS, Trade-Marks, Booklet, "General Information Concerning Inventions and Patents" and "Free Schedule" sent without obligation. Established 1915. Lancaster, Allwine & Rommel, Suite 418, Bowen Bldg., Washington, D. C.

LEASES AND DRILLING BLOCK

LEASES ROYALTIES

PRODUCING OR NONPRODUCING

Texas, New Mexico, Oklahoma

Louisiana and Illinois.

20 Years' Experience

Inquiries Invited.

B. D. BUCKLEY
60 Broadway Drive, Clayton
St. Louis, Mo.

NEW MEXICO
State Oil and Gas Leases
TWO DEEP TESTS UNDER WAY—one a 7,500 ft. test; the other a 6,000 ft. test, 40 acres and multiples thereof for sale in the HoT SPoT. Write for information. HARRY S. WRIGHT, New Mexico State Lessee Farmington, New Mexico.

LEASES AND DRILLING BLOCK

FOR SALE: Oil and gas leases and producing leases with offsets to drill. All in shallow territory. W. P. Harley, Bowling Green, Ky.

WANTED: Leases on CENTRAL KANSAS UPLIFT. Give full information on Drilling Block. Offsets or wildcat acreage. Interview later. Box B-873, The Oil and Gas Journal, Tulsa, Okla.

FOR LEASE: Half section two miles from three producing oil wells in Finney County, Kansas. Also quarter in Hobbs territory. Claude F. Wright, Hugoton, Kansas.

WANTED: Offset or potential producing leases or shallow production, (2,000 feet or less in Midcontinent or California fields. Must have merit, be legitimate, and worth the money. Write P.O. Box 652, Russell, Kansas.

ARKANSAS-Louisiana-Texas leases twenty acres up. Dollar acre up. Owners Box 1122. Little Rock, Arkansas.

EQUIPMENT FOR SALE

FOR SALE: Four 10 x 4½ x 10 Duplex Steam Pumps, make Worthington and Gardner-Denver. Good condition. Inquire T. T. Eason and Company, Enid, Okla.

OIL REPORTS

OIL in Ga., Fla., Ala., South and North Carolina? Millions of acres under lease with Geophysical and drilling work now on. Get posted. Keep posted. Send six dollars for six months sub. to "Oil Reports." No adv. accepted. No free copies. Write McIntosh Bros., Waycross, for listings, both Base and county maps. C. W. Deming, Publisher, Waycross, Ga., twenty years operating out of Tulsa.

FOR SALE—MAPS

FOR SALE—MAPS

685 oil fields in South Texas and Louisiana now mapped and maintained daily; show all intimate details of ownership and development. 2 ft. square. Price $3.50 for each field. Also County and Base Maps.

ZINGERY MAP CO. Houston, Tex.

EQUIPMENT FOR SALE

FOR SALE: In Oklahoma, the following pressure vessels:
1—5′ x 20′ — ⅞″ Shell — 1″ Head
1—8′ x 40′ — 1⅛″ Shell, 1¾″ Head
1—10′ x 48′ — 1 1/16″ and 1 1/16″ Shell, 2 1/16″ Head.
Cities Service Oil, Patridge, Bartlesville, Okla.

Refining Towers—Special Offering—Located Tulsa, Oklahoma

1 4′ 3″ x 40′ x 7/16″ type A-51-141 Burrell-Mase absorber, serial No. 153-75. Welded throughout; 14 bubble trays with 6″ cleanout flanges for each tray. 2-18″ manholes in shell. 80 lb. working pressure.
1 6′ x 43′ including 3′ skirt x 7/16″ cracking coil separator. Vessel is riveted, butt strapped and welded. 1-16″ manhole in top head and 1-16″ manhole in bottom of shell.
1 6′ x 21′ including 2′ 9″ skirt x ⅜″ Southwestern still. Vessel riveted and butt strapped. 1-16″ manhole in top head, 1-16″ manhole in bottom of shell.
1 30″ x 30′ including 2′ skirt x ¼″ welded tower. 10-6″ couplings welded in shell.
1 3′ x 33′ including 2′ skirt x 7/16″ welded tower. 12 trays.
1 3′ 6″ x 15′ including 2′ skirt x 7/16″ welded tower. 4 trays.
1 5′ x 28′ including 34″ skirt x ¼″ riveted tower. 18″ manholes in top and bottom.
1 7′ x 22′ x ¾″ shell, ⅞″ heads riveted, butt strapped and welded tower. 21′ manway in top, 30″ manway in bottom. Seven 20″ x 25″ manways in shell.
1 5′ x 28′ x ⅜″ welded flash tower. 2-18″ manholes in shell. 4″ flanged outlet in top. 3″ screwed outlet in bottom.
1 22″ x 11′ 8″ x ⅜″ welded surge drum. 2-2″ couplings and 1-1″ coupling welded in shell.
1 10′ x 22′ 4″ including 8′ skirt x ⅜″ riveted agitator. Steel walkway 2′ 10″ wide with 7/16″ floor plate. 2 holes in walkways; one 24″ x 28″ and one 18″ x 20″. Capacity of agitator 9,080 gallons.
1 3′ 6″ x 20′ 6″ including 3′ 6″ skirt x ¼″ welded flash tower. 3″ outlet in bottom, 4″ outlet in top. 1-4″ and 2-3″ outlets in shell. 2-18″ manways in shell.
1 3′ x 14′ x ½″ riveted shell. 18″ manway in one end 6″ coupling in shell.
1 72″ x 59′ 2″ x ¼″ Tulsa type fractional absorption tower. 1-12″ flanged nozzle in top head, 2-12″ flanged nozzles in shell. Also 2-4″ flanged nozzles in shell.
1 5′ x 44′ x 7/16″ riveted tower.
1 40″ x 18′ x 7/16″ Braun still. Vessel welded throughout. Working pressure 30 lbs.
1 6′ x 42′ x ½″ flash tower, 3′ skirt, equipped with 2″ coils.
2 7′ x 35′ x ½″ gray filter towers, 16′ skirt, riveted construction.
3 60″ OD x 44′ long x 4″ thick Krupp manufactured cross reaction chambers.

Located Stark (near Detroit) Michigan

1 Vis-Breaker Tower, 4′ x 64′ x ⅜″ thickness, welded construction. Four steel perforated pans in lower section of vessel, 22 steel bubble trays with 38 caps per tray, 26 downcomers.
1 Vacuum Tower, 5′ and 4′ x 36′ x ¼″ shell thickness x 7/16″ head thickness. All welded construction, fabricated by the Muskogen Boiler Works. There are 4 trays in the upper portion of the vessel and two trays in the lower portion, there are approximately 70 caps per tray. The top section of the tower is 5′ in diameter for 21′ tapering 2′ to a 13′ section 4′ in diameter.
1 Vis-Breaker Accumulator, 3′ 6″ x 8′ x 7/16″ shell and head thickness, top head dished and bottom head cone. Riveted and welded construction.

Refinery Equipment, Inc.

W. C. Berry
Union Ave. at 21st Street

Robt. W. Duden
Tulsa, Oklahoma